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REVISION HISTORY

Date	Version	Description of modification	Author
29.10.2015	ae0	QA version	Alan Del Bello
02.03.2016	Ae1	QB version	Alan Del Bello

1 General Description

This is a technical document of the ECB 2.Q PCB placed in the ADDUM and used in the **CO BX Release 7** elevator controller program.

The PCBA ECB2.Q is an extension from the ECB1.Q board for the new requirements of the EN81-20.

From the architecture the controller is split in three areas:

Machine room – ECU (elevator control unit)

Car – CCU (car control unit)

Hoistway pit – PCU (pit control unit) -new with CO BX Release 7.

1.1 Introduction

The CO BX Rel 07.00 product is an electrical elevator controller system, including 220 Group components.

The ECB2.Q PCBA contains the following main functions:

- Interface for SCPU
- LCD display and push button for HMI
- Interface to DCB
- Power management:
 - o 24VDC Biobus Line driver
 - o 12VDC emergency supply
 - o 5VDC internal
 - o 3,3VDC internal logic
 - o Battery charger
 - o Battery monitoring
 - o Control of optional automatic evacuation
 - o Protection fuses
 - o Power supply voltage monitoring status for diagnostic
 - o Phase monitoring status signal input
 - o Line voltage monitoring status signal input
 - o Main switch auxiliary switch input
 - o Motor Brake voltage monitoring status signal input
 - o Door Brake Voltage monitoring status signal input
- ESE Interface
- Biobus driver
- CAN driver

- Overlay interface
- RS232 driver
- Interface to SIM card
- Interface RTC
- Interface to MMC/SD
- Interface to ETMA
- Circuit for low voltage safety chain
- Safety chain monitoring according EN81-20 (12 points).
- Safety chain circuit with door over bridging
- Safety chain interface for safety chain contacts in shaft and machine room
- Temperature sensor circuit (for PTC circuit and for contact circuit) with LED THMH
- Temperature sensor circuit (for PTC circuit) for TES
- Temperature sensor for ECU temperature (for THMH and for ECU cooling fan)
- "Car in door zone" circuit with LED LUET
- Alarm relay RA
- Interface to SAIO PCB.
- Connection for power supply 24VDC (PSU-E)
- Connection for brake power supply (PSU-B)
- Connection for door transformer TAT
- Distribution point for car light power supply
- Distribution point for phone line
- Interface for ACVF with CAN interface
- Interface for additional drive interface for HY
- Interface for motor fan
- Interface for cooling fan
- Interface for SPH
- Interface for additional PEBO board
- JH and JTHS auxiliary contact interface
- Interface for load sensor
- RTTV relays
- Bypass safety chain
- RMA Beijing Interface

DEFINITION, ACRONYMS AND ABBREVIATIONS

Acronyms	Definition
n.u	Not Used
n.c	Not Connected
NGL	Elevator Power Supply
ECU	Elevator Control Unit
ECB	Elevator Control Board
CCU	Car Control Unit
CCB	Car Control Board
NSG	Emergency Power Supply
LC	Light Car

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LNC	Emergency Light Car
COP	Car Operating Panel
LOP	Landing Operating Panel
~	Low Active Signal
SPI	Serial Peripheral Interface
μC	Micro Controller
CAN	Controller Area Network
MOSI	Master Output Slave Input
MISO	Master Input Slave Output
LC	Light Car
UART	Universal Asynchronous Receiver Transmitter.
VCA	Voice Announcer
SMPS	Switch Mode Power Supply
BDM	Background Debug Mode interface
V _{OL}	Low level output voltage
V _{OH}	High level output voltage
SLA	Sealed Lead Acid
CC mode	Constant Current Battery Charging Mode
CV mode	Constant Voltage Battery charging Mode
C Rate	C-Rate = Battery Capacity [A] / 1 Hour
V _{T+}	Positive Going Threshold
V _{T-}	Negative Going Threshold

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1.2 REFERENCES

Ref.	Doc. Nr	Title of the document	Version	Author
1	EQ 41320991	PCBA Qualification Test – Climate Test	Ae1	A. Haugstetter
2	EQ 41009001	Spec Environ. Test – Climate	Ae 2	A. Wigger

2 .Functionality

2.1 PCBA Classification

The PCBA is classified as B and D according the Schindler ON 0-11513

Class	Class Definition	Applicable to this PCB
A	PCBA with the whole circuit or part of it operating as 'Safety Component' according to the European Lift Directive CE/95/16, Annex IV.	NO
B	PCBA with the whole circuit or part of it operating as 'Electrical Safety device' according to EN81-20 (*)	YES (**)
C	PCBA not of class A or B, for which a risk analysis exists according to ON 0-04520 and probability of the analyzed risks, may increase during production.	NO
D	Any others PCBA	YES

(*) for the list see EN81-20:2014 Annex A; the definition of the 'Electrical Safety Device' zone has to be done according EN81-50:2014 Chapter 5.15.

(**) Board contains only safety chain wiring and safety chain monitoring.

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If the brake voltage goes below 25VAC/DC the input is set to 0.



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2.3 Electronic power supplies

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P0:	The board is supplied with 24Vdc from external power supply during normal function and from 2x12V batteries in series during automatic evacuation. Designated with P0, this supply is limited to 6A, used for all external connections and to derive all others internal 24V.
P0_AE_EVAC:	Derivate from P0 in normal mode and from the 24V external battery in evacuation mode, this supply is switched on by the RAE (Relays Automatic Evacuation).
P01:	Derivate from P0, EMC and reverse polarity protected. P01 is used to generate all the power supply voltages used on the ECB2. Q PCBA (board to board connection are considered as internal power).
P02:	Derivate from P0, EMC and reverse polarity protected. P02 is used to energize the safety chain DC/DC converter.
P03:	Used to supply the peripheral devices on the car (ADDUM). P03 is capable of supplying a continuous current of 2.5A (protected by a 2.5A fuse).
P04:	Derived from P01 protected against over voltage and limited to 20mA for the LM393 IC supply used on the BIOBUS circuits.
P05:	Derivate from P0, it is EMC and reverse polarity protected, used to energize the battery charger DC/DC converter.
VDD:	14.7Vdc, VDD can supply a continuous current of 1.3A; it is the supply for emergency power.
VDD1	Internal emergency power always present. When P0 is present it is taken from VDD, otherwise is taken from the external battery (12V/3.5Ah).
VDD2	Buffered VDD1 for 3V3 and deep discharge relays supplies, it allow to switch between normal and evacuation supply without loose the controller supply.
EMER_INT	Internal emergency power always present. When VDD1 is present it is taken from VDD1, otherwise can be taken from the +12V-JEM signals during PEBO operation.
EMER_INT_SP	Derived from EMER_INT, protected against short circuit max 0.7A.
EMER_EXT_SPH	External emergency power always present. When P0 is present it is taken from VDD, otherwise is taken from the external battery (12V/3.5Ah). EMER_EXT_SPH is EMC protected and limited to by a 1A fuse.
EMER_EXT	External emergency power always present. When P0 is present it is taken from VDD, otherwise is taken from the external battery (12V/3.5Ah). EMER_EXT is EMC protected and limited by a 0.4A fuse.
VCC:	5Vdc, derived from the VDD1 (Internal emergency power always present), VCC can supply a continuous current of 0.5A; it is the supply for the 5V logic on the ECB2.
VCC1:	5Vdc isolated, it is the supply for CAN interface on the ECB2.

Modification	Ae 0	Ae 1	Ae 2	Ae 3	Ae 4	Ae 5	Ae 6		Prepared	17-07-18	delbelal
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VCC2:	5Vdc derived from VDD, VCC2 is the overload protected power supply for the external 5V logic (CLC and Motor PTC).
3V3:	3.3Vdc, derived from the VDD1 (Internal emergency power always present), 3V3 can supply a continuous current of 0.5A; it is the supply for the 3.3V logic on the ECB2.
VGG1:	-6Vdc, it is the supply for the contrast adjusts of the LCD module, mounted on the ECB2.

Summary table of the voltages generated on the PCBA:

Signal name	Voltage DC [V]			I Max
	Min	Typ	Max	
P0	19.2	24	28.8	6A
P01	19.2	24	28.8	1.5A
P02	19.2	24	28.8	1.5A
P03	19.2	24	28.8	2.5A
P04	19.2	24	28.8	20mA
P05	22.8	24	25.2	1.5A
VDD	14.3	14.7	15.3	1.3A
VDD1	10.5	14.7	15.3	1.3A
VDD2	10.5	14.7	15.3	0.4A
EMER_INT	10.5	14.7	15.3	0.5A
EMER_INT_SP	10.5	14.7	15.3	0.7A
EMER_EXT	10.5	14.7	15.3	1A
VCC	4.75	5	5.25	0.5A
3V3	3.2	3.3	3.4	1A
VCC1	4.5	5	5.5	0.2A
VCC2	4.5	5	5.5	0.2A
VGG1	-7	-6	-5	20mA

Summary table of the FUSES on the PCBA:

Fused net name	Rated Voltage	Rated Current	Type
P03	250V	2.5A	Fast
24V_BAT+	250V	6.3A	Fast
EMER_EXT	250V	1A	Fast
EMER_EXT_SPH	250V	0.4A	Fast

2.4 Interface to motor ventilator MVE

The ECUB board contains the interface electronic (Short circuit, thermal protected sink driver output) to supply the motor ventilator.

Electrical Characteristics:

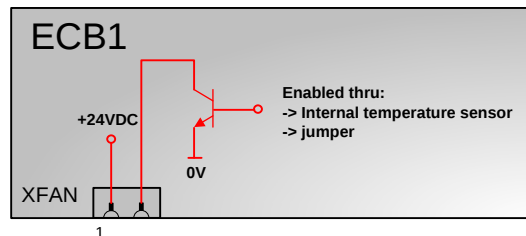
Description	Min	Typ	Max
Output Voltage	19.2[V]	24[V]	28.8[V]
Output Current	-	1[A]	1.7[A] for 30 sec
V _{OL}			0.7V @1A

2.5 Interface to cabinet ventilator FAN

The ECUB board contains the interface electronic (Short circuit, thermal protected sink driver output) to supply the cabinet ventilator and dedicated temperature sensors to trigger the FAN function.

The cabinet ventilator is turned on when the internal temperature of the cabinet increases over 50°C and turned off when it decreases below 40°C.

An additional jumper is foreseen to allow the FAN to be permanently active during test procedure.



Electrical Characteristics:

Description	Min	Typ	Max
Output Voltage	19.2[V]	24[V]	28.8[V]
Output Current	-	1[A]	1.7[A] for 30 sec
V _{OL}			0.7V @1A

2.6 SCPU Interface

The ECB 2.Q PCBA provides mechanical and electrical interface to the processor board SCPU1.

In addition for development and debugging purpose of the SW on the SCPU1.Q PCBA the a BDM connector is placed on board.

Additionally a reset button is available on the ECB2 because the SCPU will be coated in the future.

2.7 CPLD

The logic interface between the SCPU1 board and the ECB2 is done by a CPLD. The CPLD type Altera MAX 2 EPM1270T155C5N (id. nr. 430090) is used.

The CPLD contain:

- o BIOBUS2 interface
- o SCPU1 parallel bus interface with relative dedicated control and status registers for BBUS, SPI, LCD, SCPU UARTS selector
- o ECB2 IOs read and write trough the SPI chain 0 (SPI_CS0~) internal to the CPLD
- o SAIO2 or auxiliary board IOs read and write trough the SPI chain 4 (SPI_CS4~)
- o SPI interface to the MMC/SD trough the SPI chain 5 (SPI_CS5~)
- o SIM card interface logic
- o user interface (LCD and push buttons) interface
- o JTAG interface and connector for the CPLD
- o CPLD FW upgrade with the MMC/SD
- o battery charger logic
- o safety chain control logic

2.7.1 BIOBUS2 logic interface

The CPLD contain the BIOBUS interface, similar already used on the CPLD mounted on the board ECB1, whit an additional short circuit protection (see chapter BIOBUS).

2.7.2 SCPU1 parallel bus logic interface

The CPLD contain the parallel bus interface and internal SPI, BBUS, LCD, UARTS control, status registers already used on the CPLD mounted on the board ECB1.

SPI interface between the SCPU1 board and the CPLD on the ECB2

The SPI Signals from/to the μ C on the SCPU1 to/from the CPLD are the following:

- QSPI_CLK: signal used to synchronize the data transfer in serial mode
- QSPI_DOUT: signal used to send the data
- QSPI_DIN: signal used to read the data
- QSPI_CS3..0~: chip selects (active low)

The SPI signals from/to the CPLD to/from the ECB2 are the following:

- SPI_CLK: signal used to synchronize the data transfer in serial mode
- SPI_OUT: signal used to send the data
- SPI_IN: signal used to read the data
- SPI_CS5..1~: chip selects (active low)
- OUT_EN: output enable signal (active high) used to disable the outputs during the start-up of the μ C on the SCPU1.

The SPI_CS5..0~: are decoded in the CPLD according to the following table.

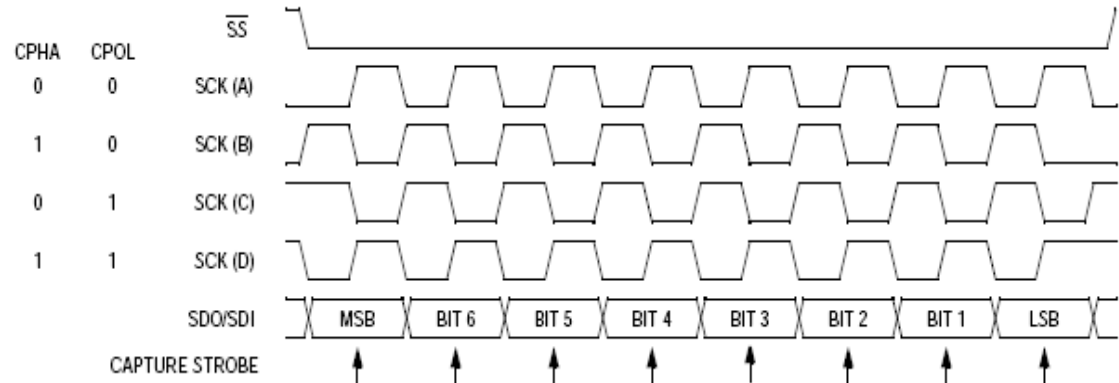
QSPI_CS ~				SPI_CS	Function
3	2	1	0	after the decoder	
1	1	1	1	SPI_CS5..0~ = 1	none
1	1	1	0	SPI_CS0~ = 0 (others = 1)	read/write of the IOs on the board ECB2
1	1	0	1	SPI_CS1~ = 0 (others = 1)	read/write of the IOs on the board DCBHY1.Q
1	1	0	0	SPI_CS2~ = 0 (others = 1)	none (used on the SMIC5)
1	0	1	1	SPI_CS3~ = 0 (others = 1)	none (used on the SMIC5)

1	0	1	0	SPI_CS4~ = 0 (others = 1)	Read/write of the IOs of the SAIO2 board or extension board
1	0	0	1	SPI_CS5..0~ = 1	none
1	0	0	0	SPI_CS5..0~ = 1	none
0	1	1	1	SPI_CS5~ = 0 (others = 1)	MMC/SD on the ECB2.Q
0	1	1	0	SPI_CS5..0~ = 1	none
0	1	0	1	SPI_CS5..0~ = 1	none
0	1	0	0	SPI_CS5..0~ = 1	none
0	0	1	1	SPI_CS5..0~ = 1	none
0	0	1	0	SPI_CS5..0~ = 1	none
0	0	0	1	SPI_CS5..0~ = 1	none
0	0	0	0	SPI_CS5..0~ = 1	none

2.7.2.1 ECB2 IOs read/ write trough the SPI chain 0 (SPI_CS0~)

The SPI chain will be as indicated below:
One single chain selected by SPI_CS0~ is used to read all the inputs and write the outputs on the same SPI transmission cycle of 48 bits (6 bytes) length.
The SPI mode used to transfer data from/to the µP to the CPLD is the following:

Parameter	Value
SPI baudrate	2 MHz (up to 15 MHz possible)
Clock phase (CPOL)	0
CPHA	0
Mode	Master on the SCPU



Note: For additional information about the QSPI module of the microcontroller on the SCPU1 board, and for the timing requirements of the QSPI module refers to the data sheet of the MCF5282 Freescale ColdFire microcontroller.

On the SPI the MSB (Most Significant Byte) is always the first bit that goes out and the first bit that comes in the µC on the SCPU.

SPI_CS0~	1 st byte In/ 1 st byte out	2 nd byte In/ 2 nd byte out	3 rd byte In/ 3 rd byte out	4 th byte In/ 4 th byte out	5 th byte In/ 5 th byte out	6 th byte In/ 6 th byteout
	MSB...LSB	MSB... LSB	MSB...LSB	MSB...LSB	MSB...LSB	MSB...LSB
Read	Input Byte 1	Input Byte 2	Input Byte 3	Input Byte 4	Input Byte 5	Input Byte 6
Write	FF	FF	FF	FF	Output Byte 1	Output Byte 2

The inputs on the ECB2 chain 0(SPI_CS0~) have to be read in the sequence as follows:

Input Byte 1								
Bit in input chain	Bit 47	Bit 46	Bit 45	Bit 44	Bit 43	Bit 42	Bit 41	Bit 40
Bit in input byte1	Bit 7 (MSB)	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0 (LSB)
Signal name	button enter	button up	button down	button esc	LUET	THMH_ECU	THMH	TES
Value	1 = pressed	1 = pressed	1 = pressed	1 = pressed	1 = car in door zone	1 = overtemp. in ECU	1 = overtemp. motor	1 = overtemp. HY
Safety	NO	NO	NO	NO	NO	NO	NO	NO

Input Byte 2								
Bit in input chain	Bit 39	Bit 38	Bit 37	Bit 36	Bit 35	Bit 34	Bit 33	Bit 32
Bit in input byte1	Bit 7 (MSB)	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0 (LSB)
Signal name	ISKT5	ISKT5 (ISPT)	ISKT1 (IUSK)	IRTS	N_JRH	N_JHM	DRH_U	DRH_D
Value	1 = end of T100 closed	1 = T100 static hoistway closed	1 = T100 supply available	1 = T100 after KTS closed	1 = not in recall mode	1 = not stop button	1 = recall up button pressed	1 = recall down button pressed
Safety	NO	NO	NO	NO	NO	NO	NO	NO

Input Byte 3								
Bit in input chain	Bit 31	Bit 30	Bit 29	Bit 28	Bit 27	Bit 26	Bit 25	Bit 24
Bit in input byte1	Bit 7 (MSB)	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0 (LSB)
Signal name	KPH	brake_voltage	JH_ON	+24V_OK	+12V_OK	EMER_OK	BAT_LOW	EVAC_BAT_LOW
Value	1 = main voltage phase OK	1 = brake voltage OK	1 = main switch (JH) ON	1 = +24V OK	1 = +12V (internal) OK	1 = +12V (external) OK	1 = emergency battery low	1 = evacuation battery low
Safety	NO	NO	NO	NO	NO	NO	NO	NO

Input Byte 4								
Bit in input chain	Bit 23	Bit 22	Bit 21	Bit 20	Bit 19	Bit 18	Bit 17	Bit 16
Bit in input byte1	Bit 7 (MSB)	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0 (LSB)
Signal name	JTHS_ON	IUSK_FAIL	IDBV	EVAC_DETECT		HW ID1	HW ID2	HW ID3
Value	1 = JTHS is ON	1 = T100 over-current	1 = IDBV pressed	1 = evacuation available				
Safety	NO	NO	NO	NO	NO	NO	NO	NO

Input Byte 5								
Bit in input chain	Bit 15	Bit 14	Bit 13	Bit 12	Bit 11	Bit 10	Bit 9	Bit 8
Bit in input byte1	Bit 7 (MSB)	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0 (LSB)
Signal name	ISKT1A	ISKT2A	ISKT3A	ISKT3B	I2KV	IRTTV	ISKT4	IKTC
Value	1 = T100 static MR closed	1 = T100 ESE-bridged hoistway closed	1 = T100 ESE-bridged MR closed	1 = T100 static MR closed	1 = T100 before 2KV closed	1 = T100 after 2KV closed	1 = T100 after KV closed	1 = T100 before KTC closed
Safety	NO	NO	NO	NO	NO	NO	NO	NO

Input Byte 6								
Bit in input chain	Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0
Bit in input byte1	Bit 7 (MSB)	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0 (LSB)
Signal name	N_SPH	N_JUEKTS	N_JUEKTC	N_KNET_TSD21				
Value	1 = SPH not active	1 = Bypass landing doors not active	1 = Bypass car door not active	1 = KNET closed				
Safety	NO	NO	NO	NO	NO	NO	NO	NO

The outputs on the ECB2 chain 0 (SPI_CS0~) will be written in the sequence as follows:

Output Byte 1								
Bit in output chain	Bit 15	Bit 14	Bit 13	Bit 12	Bit 11	Bit 10	Bit 9	Bit 8
Bit in output byte1	Bit 7 (MSB)	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0 (LSB)
Signal name	VRTTV		VSUM	VRBV	T100 on	RSTBY	LED_ERR	VMVE
Value	1 = T100 monitoring relay ON		1 = buzzer ON	1 = RBV enabled	1 = T100 enabled	1 = power save mode	0 = LED ON	1 = MVE ON
Safety	NO	NO	NO	NO	NO	NO	NO	NO

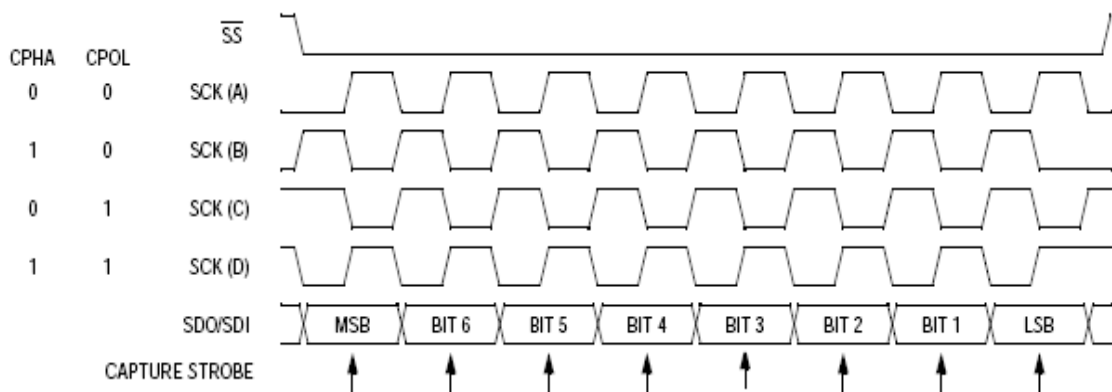
Output Byte 2								
Bit in output chain	Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0
Bit in output byte2	Bit 7 (MSB)	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0 (LSB)
Signal name	JRESG-E	+24V_JUEKTx			VRAE	VSNx	VSEF	VEF_ON
Value	1 = JRESG is in ON position	1 = Supply for JUEKTx is ON			1 = RAE ON	1 = SNx ON	1 = SEF ON	1 = EF_ON ON
Safety	NO	NO	NO	NO	NO	NO	NO	NO

2.7.2.2 DCBHY1 board IOs read and write trough the SPI chain 1 (SPI_CS1~)

The SPI chain will be as indicated below:

One single chain selected by SPI_CS4~ is used to read all the inputs and write the outputs on the same SPI transmission cycle. The SPI mode used to transfer data from/to the µP to the CPLD is the following:

Parameter	Value
SPI baudrate	2 MHz
Clock phase (CPOL)	0
CPHA	0
Mode	Master on the SCPU

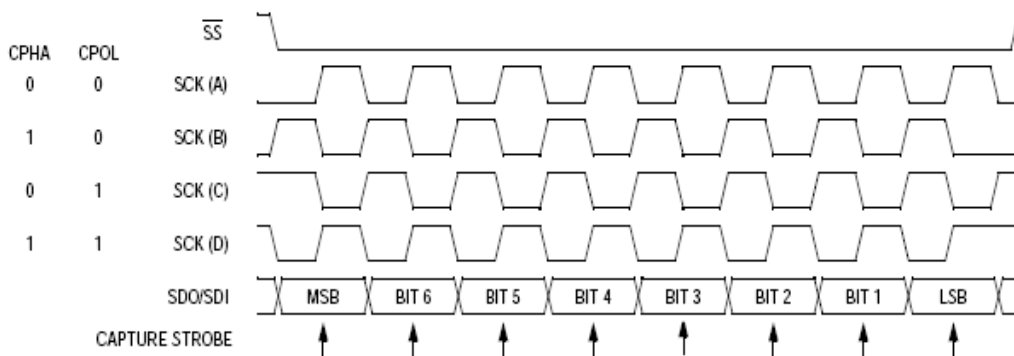


2.7.2.1 SAIO2 read and write trough the SPI chain 4 (SPI_CS4~)

The SPI chain will be as indicated below:

One single chain selected by SPI_CS4~ is used to read all the inputs and write the outputs on the same SPI transmission cycle. The SPI mode used to transfer data from/to the μ P to the CPLD is the following:

Parameter	Value
SPI baudrate	2 MHz
Clock phase (CPOL)	0
CPHA	0
Mode	Master on the SCPU



2.7.2.2 MMC/SD on the chain 5 (SPI_CS5~)

One single chain selected by SPI_CS5~ is used for the MMC/SD. The SPI baud rate will be 2 MHz, master on SCPU1, CPOL,CPHA=1.

2.7.2.3 SIM card interface logic

The CPLD contain similar SIM card interface logic as implemented on the CPLD mounted on the board ECB1.

2.7.2.4 User interface (LCD, push buttons, buzzer)

The CPLD contain similar LCD interface logic as implemented on the CPLD mounted on the board ECB1.

The buttons esc, up, down, set, will be read using the SPI chain 1 (SPI_CS0~). The LCD has to be controlled by the LCD registers implemented on the CPLD similar as implemented on the board ECB1.

2.7.2.5 JTAG interface connector for the CPLD

The ECB2 board should contain the JTAG interface connector, same as ECB1.

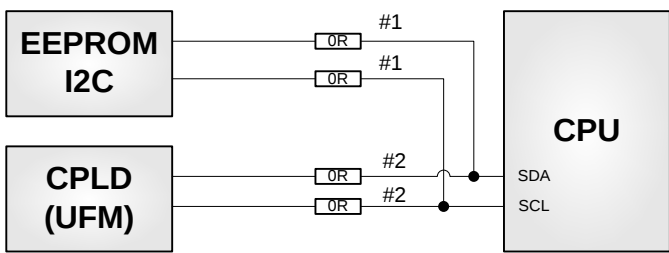
This connector will not be mounted in the KA version of the PCBA.

2.8 HW Identifier

The HWID is stored in an I2C EEPROM of 2Kbit connected through zero Ohm resistors instead of the UFM. This is the result of an analysis done on some ECB2 boards, in which the SCPU was not able to access the UFM correctly.

UFM HW ID is not used, default HW configuration is the #1 (see table below).

HWID 2004 (according: ESA04138 HW Identification 2004 document)									
HW ID sel.	Layout. Ver	Device Name	[Gen]	PCB Name	Form	Ver	Ident No.	Osc. Freq.	Check sum
0x02	0x02	ECB2	1	ECB2	Q	C	560501	0	1 byte



Components	HW ID from UFM	HW ID from EEPROM
#1	Not mounted	Mounted
#2	Mounted	Not mounted

2.9 Safety chain

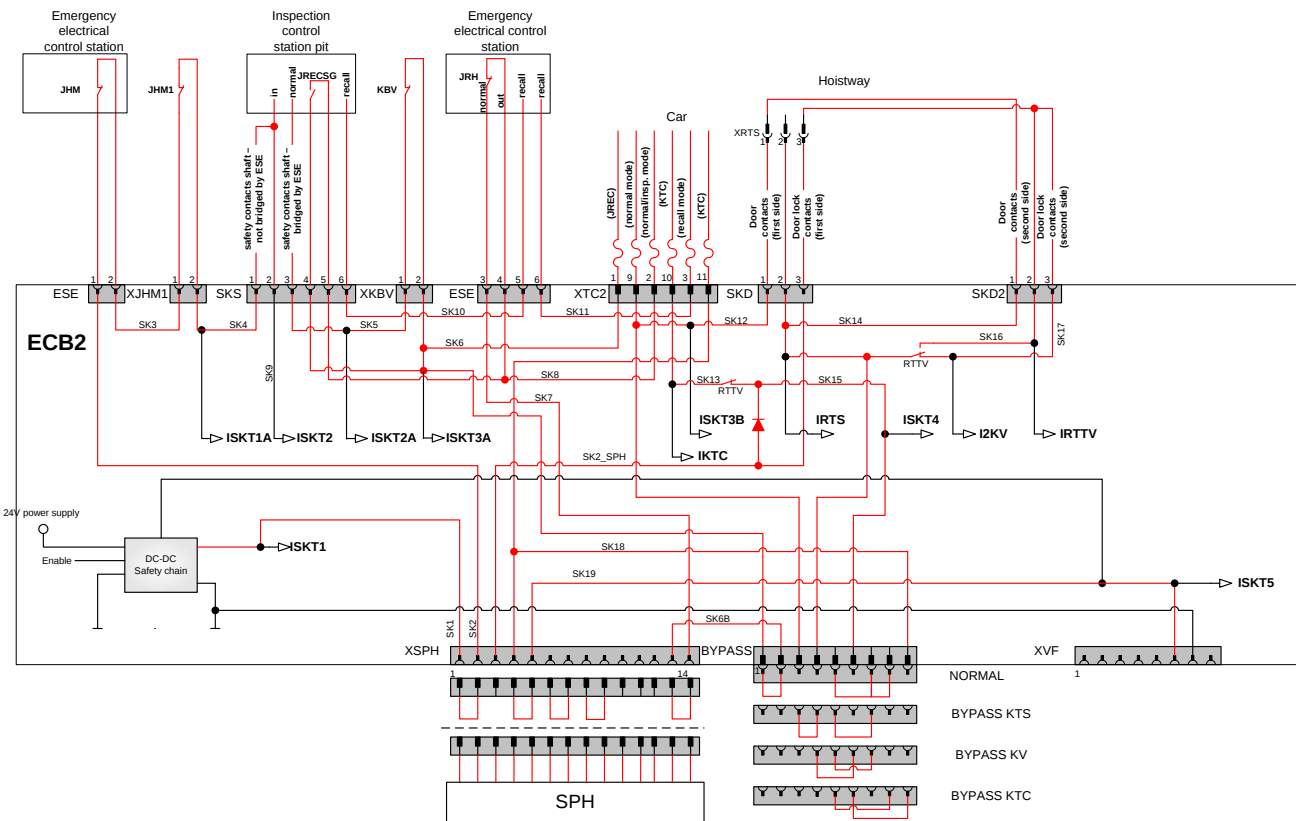
The safety chain is a Protective Extra Low Voltage circuit, an electrical system in which the voltage cannot exceed the value of 50 Vac RMS or 63Vdc.

The safety chain is monitored against overcurrent and voltage continuity.

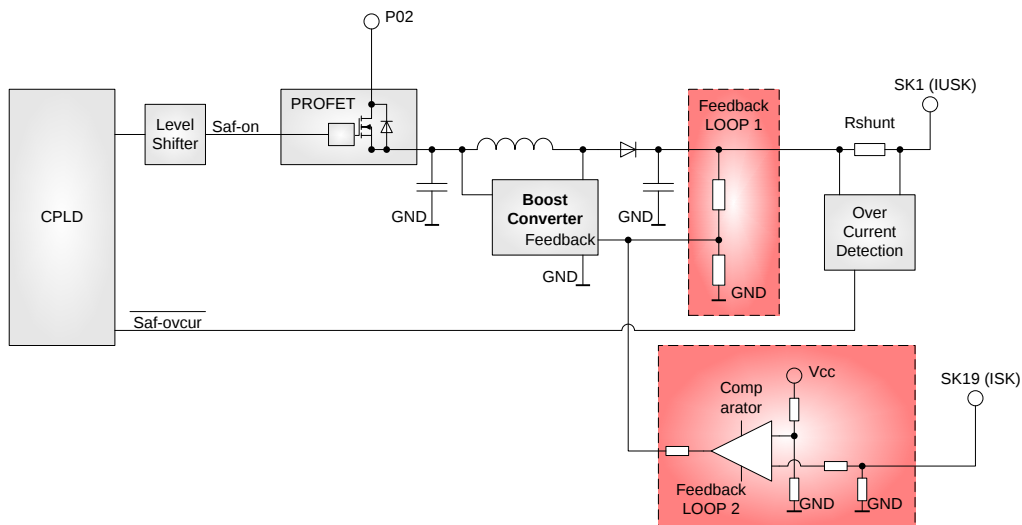
The voltage levels in the safety chain are read in 12 different points and a logic signal is feed in to the logic circuit and read by the SCPU for diagnostic purpose.

To compensate the voltage drop of the wiring of the safety chain, the voltage feedback for the boost regulator is taken at the end of the chain.

Safety chain block schematics:



2.9.1 Safety chain power supply



- Common ground between Safety chain and controller.
- 24V-10% to 26V+5% regulated on safety chain outputs, if safety chain is closed.
- Less than 52Vdc, if safety chain is open.
- Minimum current through safety contacts 20mA guaranteed by a load on the board.
- Maximum Rated safety chain continuous current **1A**.
- The circuit is able to detect a current overload of $I_{overload} = 1.1A$. In this case, after 150ms, the safety chain voltage is permanently turned off. This error can be read on the SPI chain of the CPLD. To reset the error status the DUEISK-A button has to be pressed.

2.9.2 Safety chain monitoring

Safety chain point name	Safety chain detection point name (corresponding name on BX6)
SK1	ISKT1 (IUSK)
SK4	ISKT1A
SK5	ISKT2A
SK6	ISKT3A
SK9	ISKT2 (ISPT)
SK12	ISKT3B
SK13	IKTC
SK14	IRTS (RTS)
SK15	ISKT4
SK16	IRTTV
SK17	I2KV
SK19	ISKT5 (ISK)

2.10 Battery charger power supply

2.10.1 Battery charger behavior

The battery charger can be used to charge a single 12V/3.2Ah battery or two 12V/12Ah when automatic evacuation option is available.

To avoid an asymmetric battery charging, the two 12V/12Ah batteries are charged alternatively for 5 min. This method guarantees an optimal charge condition and a maximum life expectancy for the batteries.

The battery charger uses a 3 step constant current - constant voltage and temperature compensated topology:

- Initial constant charging current of 0.3 CA (for the 3.2Ah) and 0.1CA (for the 12Ah).
- Switch to the 1st step, trickle charge, (constant current to constant voltage 1) when the current goes below the constant current threshold. This step allows a cell voltage of 2.35 to 2.5V (depending from the temperature).
- Switch to the 2d step, float charge, (constant voltage 1 to constant voltage 2) when the current goes below 0.05 CA. This step allows a cell voltage of 2.25 to 2.3V (depending from the temperature).

Maximum Charge Rate	Constant Voltage [V/cell]	Charge Time [hours]
0.3C	2.25	<10

2.10.2 Battery protections

The battery charger has following protection:

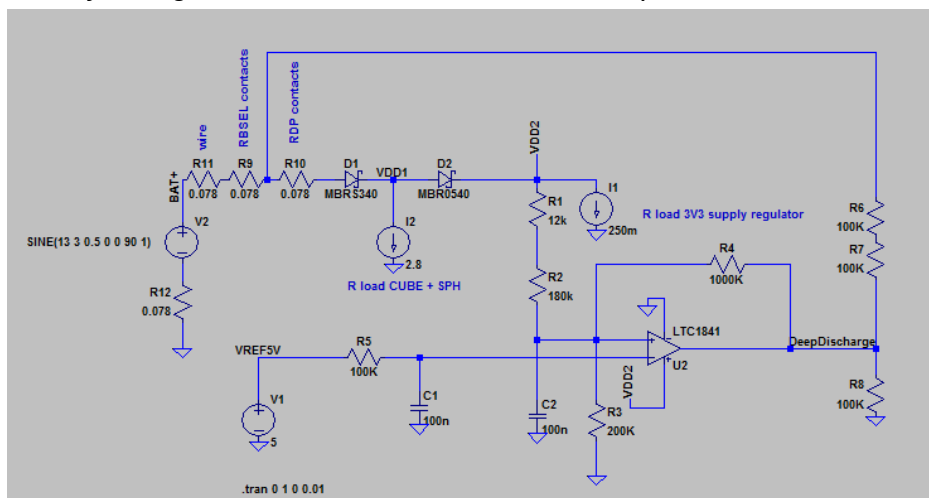
1. Deep discharge protection for the 12Vdc emergency power battery.

The disconnecting threshold consider the voltage drop of the wiring, relays contact and diodes; between the battery terminals and measuring circuits.

The thresholds are the following, and are dependent from the load:

Battery voltage disconnection **TH_{L_min}: 10.8Vdc** (with minimum load 0.5A).

Battery voltage disconnection **TH_{H_max}: 11.5Vdc** (with maximum load 2.8A).



2. Time-out disconnection, 3h after JH switched off.
3. Reverse battery connection protection for the 12Vdc emergency power battery.

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2.10.3 Battery measurement

- 1. Low battery detection for the 12V emergency battery.
- 2. Low battery detection for the 24V automatic evacuation 2x12V batteries.

2.10.4 Battery test

- 1. An internal load of 350mA is connected to the battery for a certain time and the voltage monitored through the two low batteries measurement point, in order to guarantee the capacity to sink a current of 0.3A continuous for at least three hours without activation of the deep discharge protection.

2.11 Emergency Electrical Operation Device (ESE)

ESE is not part of the ECUMR, it is connected to the ECB2 when needed with a cable of maximum 2 meters on the connector XESE.

The ESE is composed of:

- JRH: Recall mode ON/OFF: 2 contacts in safety chain, 1 contact logic.
- JHM: Emergency Stop: 1 contact in safety chain, 1 contact logic.
- DRH-U: Recall Up: 2 contacts in safety chain, 1 contact logic.
- DRH-D: Recall Down: 2 contacts in safety chain, 1 contact logic.

The ESE over-bridges the safety contacts: KF, KNE-U, and KBV. The 4 contacts logics are connected on inputs of the CPLD (24V inputs N_JRH, N_JHM, DRH-D and DRH-U).

Input Threshold:

- Input low level: $V_{IL} \leq 7.7V$
- Input high level: $V_{IH} \geq 12.8V$

2.12 Phase control

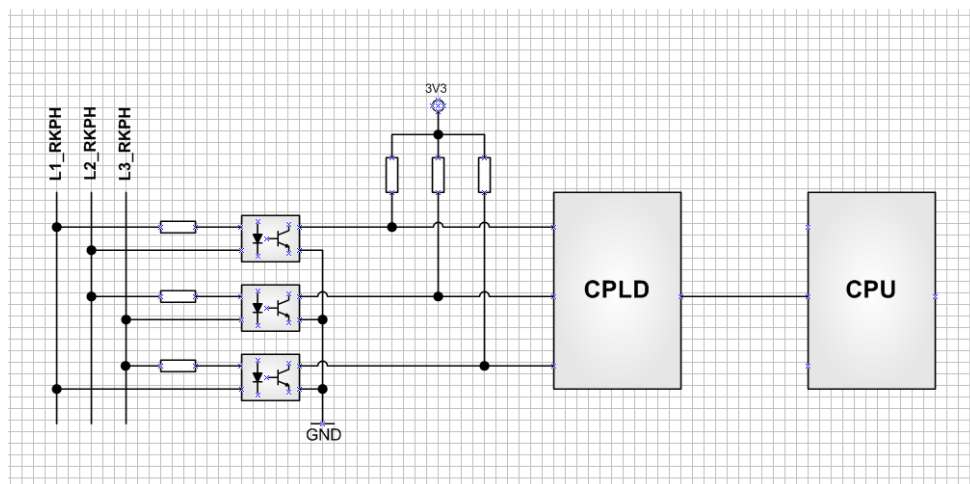
On the ECB2 a phase control logic is integrated on the CPLD, it check for L1, L2 and L3 presence, and rotation.

If there is any error on the rotation sequence of the phases or if some phases are not present the information is sent to the CPU.

Threshold range of the voltage supervision is:

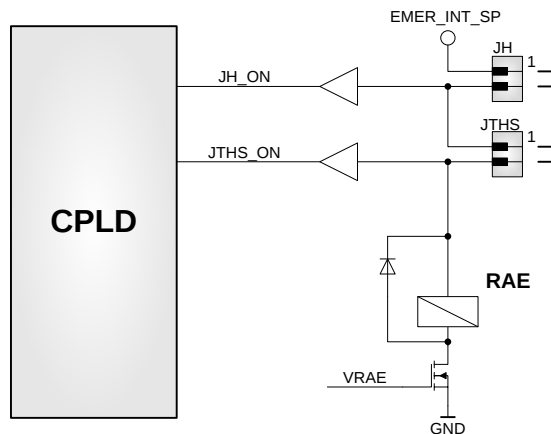
$V_{IL_{min}}: 40 \text{ VAC}$

$V_{IH_{max}}: 150 \text{ VAC}$



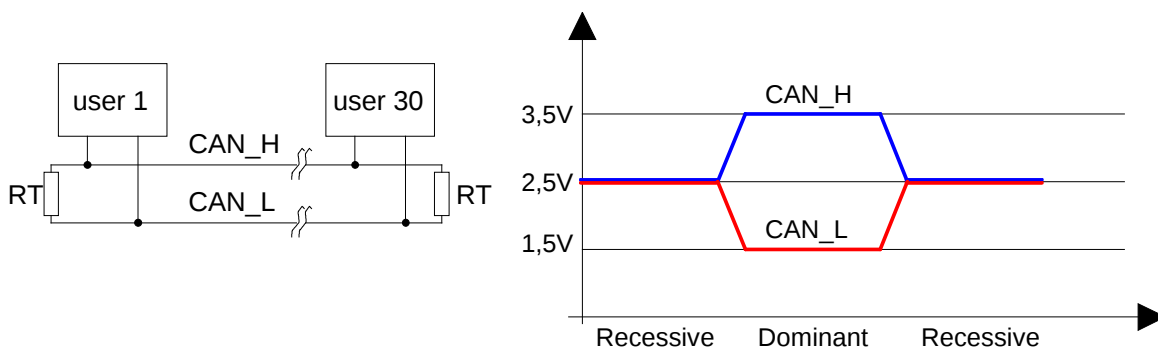
2.13 Main switch (JH and JTHS) supervisor

On the ECB2 the supervision of the JH and JTHS main switches are inputs of the CPLD that are used during the automatic evacuation. These two inputs are connected to the internal short circuit protected emergency power supply, and used to supply the automatic evacuation relays (RAE).



2.14 CAN interface

The ECB 2 implements a fully isolated CAN node. The CAN controller is implemented in the μ P on the SCPU1. On the ECB 2 there is the CAN transceiver, the CAN termination resistor, the optical isolation and two external CAN connectors. The CAN transceiver is compatible with the ISO11898 norm.



Parameter	ISO 11898
Max. bit rate	1 Mbits/s at 40 m
No. of connections	30
Cable	line impedance 108 Ω ...132 Ω
Line termination (RT)	Line impedance 2 x 120 Ω nom.
Short-circuit protection	-3V to +16V
Recessive status	$V_{CAN_H} - V_{CAN_L} = -0.5V \dots 50mV$
Dominant status	$V_{CAN_H} - V_{CAN_L} = 1.5V \dots 3V$
TX current	25mA to 50mA with 60 Ω

2.15 Real time clock (RTC)

A serial I2C real time clock type M41T0 from ST Microelectronics is mounted on the ECB2. A 1F typ. gold capacitor permits to maintain the data on the real time clock for around 3 weeks, without an emergency external supply. The I2C address of the real time clock is 0xD0.

2.16 BioBus (BBUS)

The BioBus is a three-wire bus, that supply the landing devices (LOP, LIN) by the connector XBIO pin3 with P0 (24Vdc). Information are transmitted on the signal BIOP with a current source of 500mA connected on pin2 of connectors XBIO, the current source is supplied with 24Vdc (P01). The purpose of this bus is to exchange information between several nodes (distance: from 10 up to 200 meters). This bus allows multi-mastering (collision avoidance) with no need for a supervisor node.

The data has the following characteristics: asynchronous, NRZ coded, 9.6 Kbaud, 8 bits (LSB first), 1 stop bit, no parity. This bus is controlled by the microprocessor MPC5282 on the SCPU 1, on the CPLD on the ECB 2 there is an hardware interface between the SCPU 1 parallel bus, IRQ1 and the BioBus current source on the ECB 2 by mean of the signals BBIN and BBOU.

2.16.1 BioBus source current

The BioBus source current is on the ECB 2. The current source (BioBus transceiver) is connected to the BioBus controller on the CPLD using the signals BBIN and BBOU. The BioBus provided on ECB2 is the 24V version of BioBus. The devices for the floor calling and signalization whose can be connected directly to the shaft wiring could be only of the type supplied with 24V.

The electrical characteristics of the BioBus current source are the following:

BioBus (24V)	Devices 24V
Power Supply	19.2Vdc ...30Vdc
Max. Source Current	500mA

The source current can be enabled or disabled by the internal logic of the CPLD and is short circuit protected by means of the signal BB_ISRC_EN~.

In case of short circuit on the BioBus, after 20ms the CPLD switch off the current source (BB_ISRC_EN ~ = 1) for a period of 200ms. After this period it checks the status for 20ms and if the short circuit is removed it restart working normal (BB_ISRC_EN ~ = 0), otherwise it switch the BioBus off for 200ms and so on.

The BioBus reset cycle is composed of 3 sec in short-circuit followed by 3 sec of communication; the cycle can be repeated till then times before stopping the BioBus. The BioBus signal is high when it is bigger than 77% of the supply (18.5V with supply 24V) and is low when it is smaller than 66% of the supply (15.8V with supply 24V).

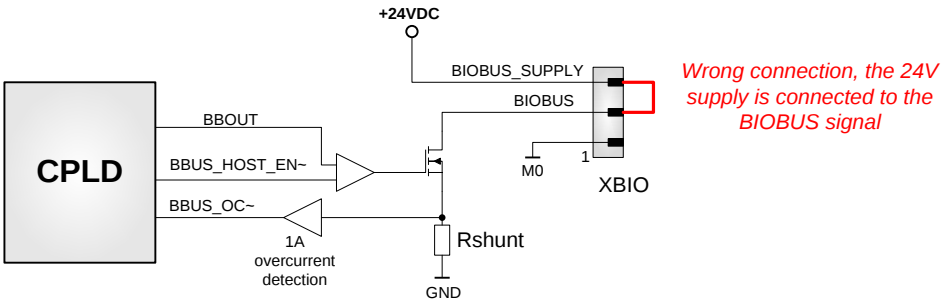
2.16.2 BioBus controller

- The SCPU 1 acts directly on the BioBus via the UART1 and IRQ1.
- The CPLD checks the BioBus signals BBIN and BBOU and the UART1 signals and signalize the collision to the SCPU (via IRQ1).
- Control the transmission flow between the UART1 and the BioBus using RTS1 and CTS1 signals
- Signalize when the BioBus is free to the CPU (via IRQ1)
- Signalize the end of frames to the CPU (via IRQ1)

2.16.3 BioBus mosfet over current protection

To avoid damages of the BioBus master transmitter mosfet, in case of wrong connections of the BioBus (connection of the 24V supply on the BioBus line), an additional protection is implemented on the ECB2 BioBus driver.

If the current sink from the BioBus mosfet is > 1A, an overcurrent signal (BBUS_OC~ = 1) is read by the CPLD and the BioBus transmission is stopped for at least 1s before the master try again to send data.



2.17 Temperature Monitoring

The ECB2 contain a circuit for monitor the temperature of the elevator motor, machine room and cabinet.

2.17.1 KTHM

The KTHM circuit on the ECB2 is used to monitor the temperature of the elevator motor.

This circuit measures the value of the PTC mounted on the elevator motor. If this value is less than 2.3 k Ω , the motor temperature is below its maximum permissible value. If this value is greater than 4 k Ω , the motor is too hot. The value of the PTC is less than 2.3 k Ω when its temperature corresponds to the nominal temperature minus 5°C and is greater than 4 k Ω when its temperature corresponds to the nominal temperature plus 5°C.

The temperature of the elevator motor is monitored by the SCPU 1 using the THMH input that is on the SPI chain 0 internal to the CPLD.

When the THMH input is at 0 V, this means that the elevator motor temperature is below its maximum permissible value, when the THMH input is at 3.3V (3V3), the elevator motor is too hot.

2.17.2 TES

With the output TES of the comparator it is possible to control a relay (low side output), which switch off for example the main contactors. This is a possibility to make an hydraulic elevator safer; because in case of a SW failure the pump might not switch off (if the safety chain is closed).

The comparator circuit is designed for following values:

If the value of the PTC is higher than 85 k Ω (the switching point must be between 75 k Ω and 85 k Ω), the pump motor temperature is much higher as the maximum permissible value; the pump motor must switch off immediately (fire danger!), independent if the elevator is in travel or not.

If the comparator has activated the temperature emergency stop, the resistor of the PTC must go below 5 k Ω , before the temperature emergency stop is deactivated.

Note: Normally if the value of the PTC is higher than 4 k Ω , the THMH is active and the elevator controller waits after the trip until the motor has cooled off (PTC < 1,6 k Ω).

The difference between 4 k Ω (switching point of THMH) and 75 k Ω (min. switching point of temperature emergency stop) is about 20°C.

2.17.3 THMR

If a contact is used instead of a PTC, the input THMR on the ECB2 has to be used. A comparator LM393 is used to detect the level of this input. The output of the comparator is connected with an OR gate to the output of the PTC temperature control. So if the contact is open, the THMH input is 1.

Input Threshold:

- Input low level: $V_{IL} \leq 4V$
- Input high level: $V_{IH} \geq 16V$

2.17.4 Embedded Temperature Sensor

An embedded temperature sensor is mounted on the ECB2. When the temperature on ECUMR is above 50°C the cabinet FAN is turned on (the hysteresis is 10°C), when the temperature is above 60°C the THMH input is set to 1 and then reset to 0 when the temperature goes down below 50°C.

Note:

When no PTC or external contact is used, these inputs should be bridged on the related connectors.

2.18 Overlay interface

The ECB2 board provides an electrical interface for the overlay. The electrical interface is only a CAN connection and a +24VDC power supply.

2.19 ETMA interface

The μP UART0 on the SCPU 1 is used for the ETMA interface.

The UART0 is used with the RTS and CTS signal for the ETMA.

A GPIO pin of the μP on the SCPU1 (signal PQA [4]) is used as Reset output for the ETMA.

The ETMA is plugged on a 8 pin RJ-45 connector (ETMA connector).

2.20 Function RMA Beijing interface

The PCBA ECB2.Q provides an electrical interface for the RMA Beijing.

The electrical interface must be connected in parallel to the ETMA interface like on the SMICE32.Q board.

Same position of the connector in correspondence to the fixation holes as on the SMICE32.Q board.

2.21 Ethernet interface

The ECB2 board provides an Ethernet interface. Same as implemented on the SMICHMlx.Q board. Ethernet interface will be not mounted by default, only foreseen for the next generation CPU board that are not developed at the moment.

2.22 RS-232 Interface

The ECB2 board has an RS-232 transceiver. The transceiver is connected to the CPLD similar as implemented on the ECB1. The RS-232 interface is provided with a DSUB 9 pins male connector as implemented on the board ECB1.

The DSUB connector is used for SPECI/VCOM devices and must be named RS-232.

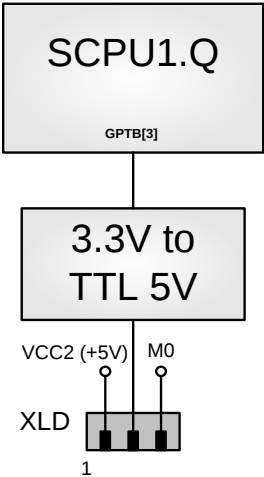
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2.23 Interface for load measurement

For the load measurement, a sensor composed by piezo and quartz is used. The output is a (TTL level) frequency signal, which varies with the load (frequency range: 10..20 kHz), this signal is read by the CPU. The controller is able to know if the sensor is operational or defected by simply checking the frequency range. The calibration of the system is done during the installation trip. If no car load cell is connected, the input can be used as overload input. The input must be a TTL-level signal. The software recognizes if a car load cell or an overload contact is connected.



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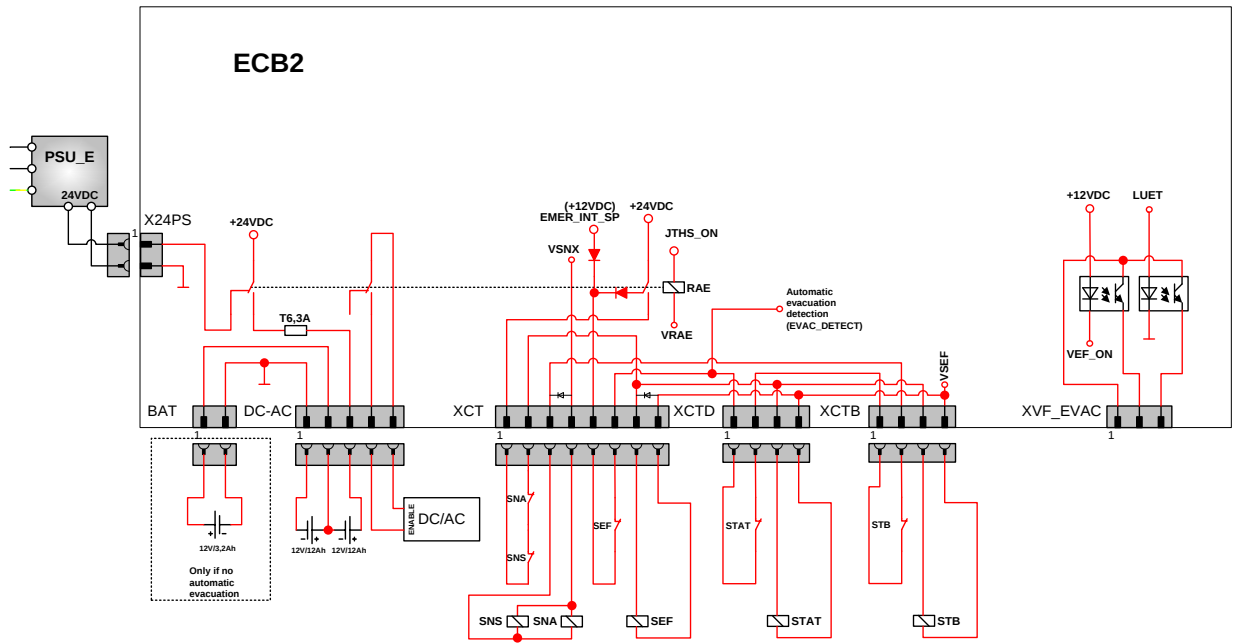
2.24 Interface for automatic evacuation

The ECB2 contain an interface for automatic evacuation. The required hardware will be optional in the ECU. The function is similar to the function on the SEMBX with the difference that the control of the automatic evacuation will be implemented in the main SW instead of the CPLD.

The ECB2 board contains all the required connectors, inputs and outputs to control the optional hardware.

The ECB2 is able to detect a connected option automatic evacuation, by reading the SEF feedback (FB_SEF) at ECB2 power-on, FB_SEF input is 12V tolerant in order to guarantee that the automatic evacuation option is detected in emergency supply).

The EVAC_DETECT signal on the SPI chain 0 of the CPLD is use to send this information to the CPU.



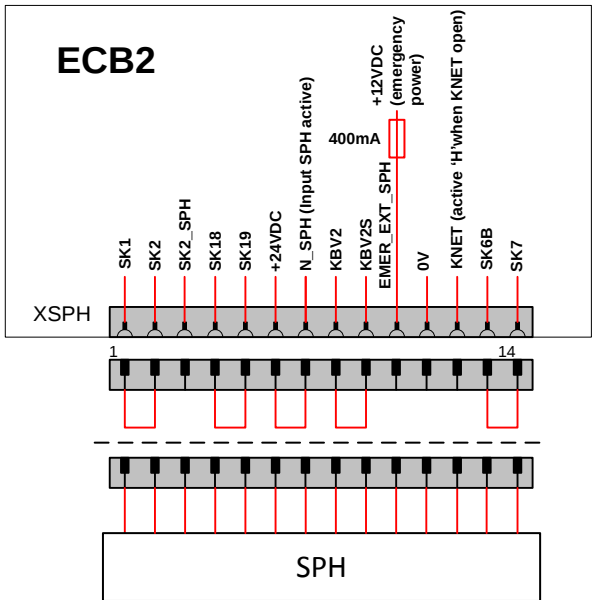
2.25 Interface for SPH21

The ECB2 contain the interface for SPH (short pit and head room control).

The SPH21 connector on the ECB2 board contains all the signals which are interrupted in case of a SPH21. In case that no SPH21 is connected, a connector over bridge the interrupted signals. To avoid that in field this interface can easy over bridged (misuse) an uncommon connector is used (MOLEX Type 87427 2x6 poles).

The PCBA ECB2.Q provides the power supply with a T400mA LB 250V fuse for the SPHRBX board.

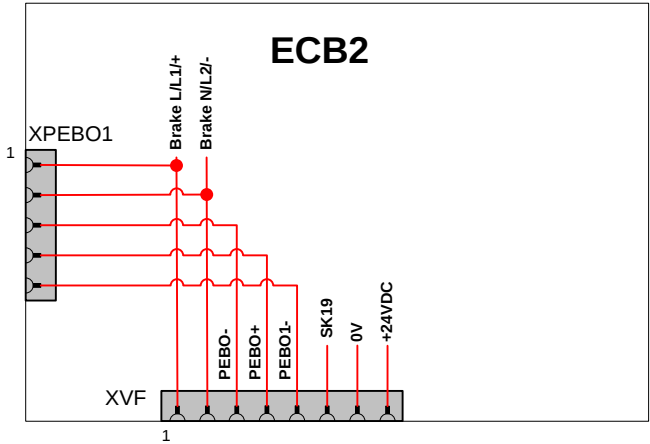
The input signal N_SPH and KNET are connected as input signal at the CPLD.



2.26 Frequency converter interface

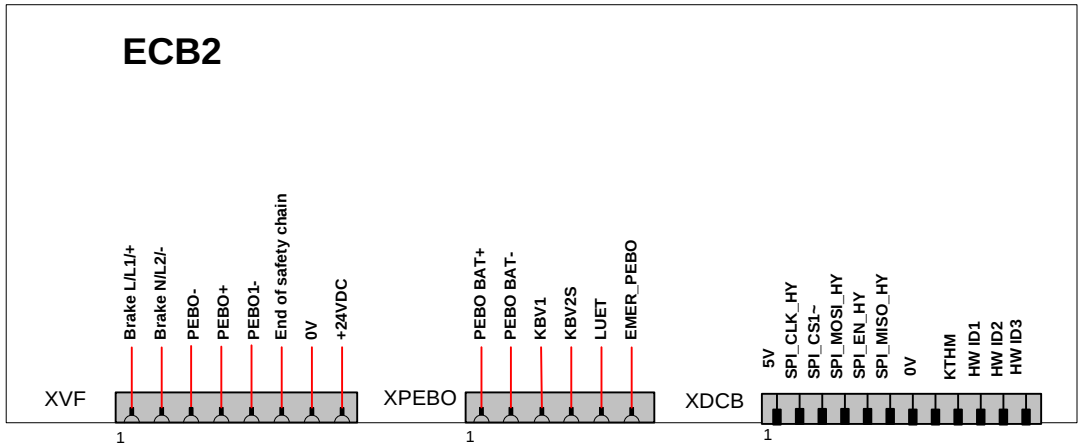
The ECB2 board contains the interface to the frequency converter.

- Brake supply
- Half brake test supply
- End of the safety chain
- 24VDC power supply to the frequency converter



2.27 Interface to additional board for the PEBO function (DCBPEBO1/2)

The ECB2.Q board contains the interface for additional board for the PEBO function.
This board will be placed at the lower end of the ECB2 board.



2.27.1 DCBPEBO1

The DCBPEBO1 board will use the same connector as for the frequency converter interface. Additionally there is a second connector for the additional signals requested from the PEBO function.

2.27.1 DCBPEBO2

The ECB2.Q board contains the interface for additional board for the PEBO in case of use with the ECB61.Q brake module.

The DCBPEBO2 board will use the same connector as for the frequency converter interface (XVF). Additionally there is a second connector for the signals requested from the PEBO function (XPEBO).

DCBPEBO2 board can be detected by the CPU (via CPLD interface) thru the 3 bit HW ID present on the XDCB connector (**ID1='H'**; **ID2 = 'L'**, **ID3 = 'H'**).

This information is used by the CPLD battery management logic to detect that 2 x 12V/12Ah battery are connected (same configuration as for automatic evacuation option).

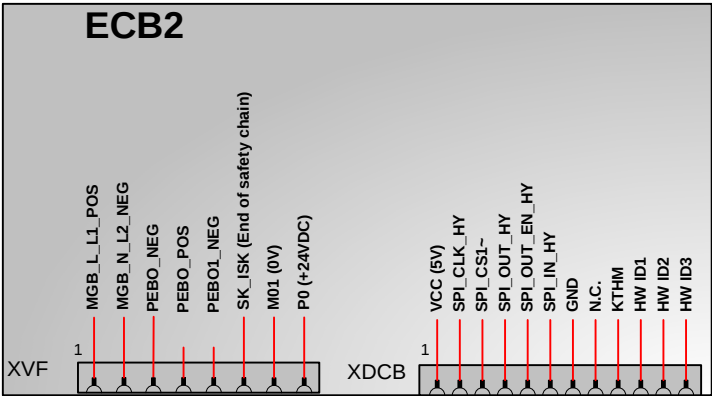
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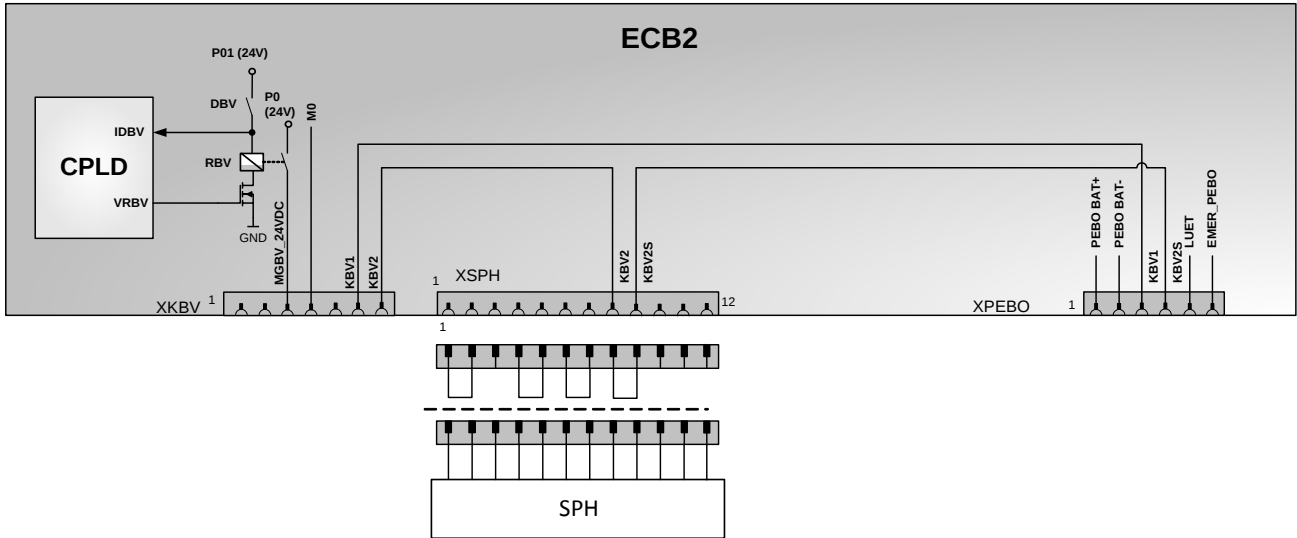
2.28 Hydraulic drive interface

The ECB2 contains the interface for an hydraulic drive, all the required power components (contactors, soft start, frequency converter, ecc) are part of the hydraulic drive unit. The ECB2 board itself contain only the control signals for the interface, the required relay will be placed on an additional board (DCBHY1). The ECB2 supports the power supply, the end of the safety chain and the I/O signals (via SPI) for the hydraulic drive unit. For the power supply and the end of the safety chain the same connector as for the frequency converter interface is used. The other signals are placed on an additional board to board connector. DCBHY1 board can be detected by the CPU (via CPLD interface) thru the 3 bit HW ID (ID1='L'; ID2 = 'H', ID3 = 'H').



2.29 Interface for KBV trigger

The ECB2 board contains the interface to supply (24VDC) the magnet for the trigger of the KBV.



An input (IDBV) and an output (VRBV) of the SPI chain 0 of the CPLD are used for this function.

The KBV1 is a 24Vdc / 1A max sourced by the DCBPEBO1/2 PCBAs, if one of the KBV contacts open, the DCBPEBO1/2 safety relays open and the brakes close.

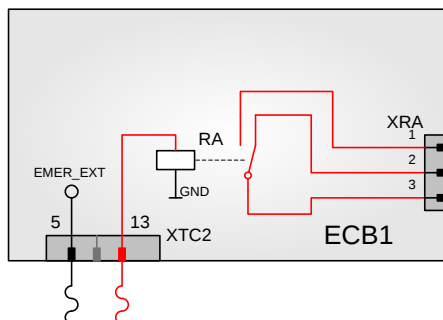
2.30 RA relay

On the ECB2 is implemented a relay for the alarm circuit.
A relay with a normally open contact (NO) is used.

2.30.1 Electrical Rating

- Voltage: 230Vac/150Vdc max,
- Current: 1A max
- Power: 250VA max
- Min. Load: 10mA @24Vdc

2.30.2 Block schematic



2.31 Floor level indication (LUET)

The circuit indicates by means of a LED called “LUET” if the car is in the door zone. The rescuer person performing the manual evacuation of the passenger in case of elevator failure needs this indication. The LUET is located in the controller cabinet, so it is visible for the person performing the manual evacuation procedure. Also a connector for an external LUET indicator is present.

Note:

The LUET polarity is inverted respect to the BX6 controller (ECB1), because on the CCBM2 car controller board there is a source driver instead of the sink driver.

Input Threshold:

- Input low level: $V_{IL} \leq 3V$
- Input high level: open ($V_{IH} \geq 7V$)

2.32 User interface

2.32.1 LCD

The ECB2 contains a 2x8 digit LCD with white characters and blue backlight. The LCD is controlled by the parallel bus implemented on the CPLD. Push buttons

The board contains 7 tactile push buttons, 4 used as HMI interface, named ESC, UP, DOWN, OK; 1 for the KBV trigger signal; 1 for the CPU reset and 1 for the DUEISK-A for the safety chain supply overcurrent reset.

Function	Silkscreen	Behavior	Type
HW RESET	CPU RST	Reset for the SCPU	straight
T100 activation	DUEISK-A	Activation of the T100 power supply	straight
GBV trigger	DBV	Activation of GBV trigger relay	straight
HMI	UP,ESC,OK,DOWN		straight

2.32.3 Buzzer

A buzzer with characteristics of sound level of minimum 85dB@10cm, frequency of 2.7 KHz is driven by the CPLD.

2.32.4 Switches

Function	Silkscreen	Behavior	Type
CAN termination	CAN (ON/OFF)	Termination for CAN bus on ECB2.Q	Right angle

2.32.1 Jumpers (only for development)

Function	Silkscreen	Behavior
I2C	I2C	SCL/SDA access point for programming the EEPROM HW ID during development. NOT MOUNTED ON FINAL VERSION
3V3	3V3	3.3V/GND access point for test purposes NOT MOUNTED ON FINAL VERSION
EEPROM write Enable	WE	Write enable access point for programming the EEPROM HW ID during development. NOT MOUNTED ON FINAL VERSION
RTTV test	-	Give the possibility to test failure of the RTTV during integration test. NOT MOUNTED ON FINAL VERSION

2.32.2 LEDs

The board contains 10 LEDs used for diagnostics.

FUNCTION	SILKSCREEN	HW RELEVANT	TYPE	COLOR
Car in door zone	LUET	active when the car is on the door zone	STRAIGHT	BLUE
24VDC power supply	24V	active when 24V is present	STRAIGHT	GREEN
Emergency power supply	EMER	active when 12V emergency supply is	STRAIGHT	GREEN

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		present		
24VDC power supply car	24V_CAR	active when 24V for the car is present	STRAIGHT	GREEN
BIOBUS	BBUS	active when the BIOBUS (signal BIOP) is at 0V	STRAIGHT	GREEN
SW DOWNLOAD (SCPU)	DWNLD	Controlled by PQA1 GPIO pin of the μ P on the SCPU1	STRAIGHT	YELLOW
OVERTEMPERATURE	THMH	active when the motor or ECU over temperature is detected	STRAIGHT	RED
ERROR	ERR	Controlled by the CPLD, when light on means an error condition	STRAIGHT	RED
Battery (emergency power) warning	BATT warn	controlled by the power management	STRAIGHT	RED
Battery (evacuation) warning	EVAC warn	controlled by the power management	STRAIGHT	RED

2.33 Earth connection

The earth connection is made by the fixing screw. To improve connection reliability a chopper disk is used.

3 CONNECTORS

General:

- All Pin1 must be marked on the silkscreen
- The values U_{max} and I_{max} are the relevant values for the layout

Silkscreen	Description / Spec	Type
SCPU1	SCPU board connector	SO DIMM, 144 pins, vertical
JTAG	CPLD JTAG connector	Pin header, male, 2x5 poles, vertical, pitch 2.54mm
BDM	BDM connector	Pin header, male, 2x13 poles, vertical, pitch 2.54mm
MMC/SD	MMC/SD connector	MMC/SD connector. Vertical MMC/SD holder
SIM CARD	Chip card connector	Chip card connector
RS232	Serial connection for SPECI	DSUB9 connector, straight
XCAN_EXT	CAN connection to VF	WAGO 3 pins, male, 5 mm, coded, vertical
XETMA	ETMA connector	RJ45
XETHERNET	ETHERNET connector	RJ45
XOVERLAY	Overlay connector	WAGO 5 pins, male, 3,5 mm, vertical
XMAIN	Main power supply input	WAGO 5 pins, male, 7,5 mm, coded, vertical
XRKPH	supply for phase control and PSU E	WAGO 3 pins, male, 7,5 mm, coded, vertical
XHL	Car light supply input	WAGO 2 pins, male, 7,5 mm, coded, vertical
XLUET	Connector for LUET indicator	WAGO 2 pins, male, 5 mm, coded, vertical
XTT	Phone line	WAGO 2 pins, female, 5 mm, coded, vertical
XJH	Main switch supervision	WAGO 2 pins, male, 3,5 mm, vertical
XJTHS	JTHS supervision	WAGO 2 pins, male, 3,5 mm, vertical
XPSU_B	Connector for brake supply	WAGO 6 pins, female, 7,5 mm, coded, vertical
XTAT	Connector for door supply	WAGO 7 pins, female, 7,5 mm, coded, vertical
XPSU_E	Supply for power supply unit	WAGO 3 pins, female, 7,5 mm, coded, vertical
X24PS	+24VDC power supply	WAGO 2 pins, male, 5 mm, coded, vertical
X24_CAN	+24VDC ext. for CANIO option	WAGO 2 pins, male, 5 mm, coded, vertical
XPSU_P	Supply for additional power supply unit	WAGO 3 pins, female, 7,5 mm, coded, vertical
XAPS	Connector for landing fixtures supply	WAGO 3 pins, male, 5 mm, coded, vertical
XTC1	Traveling cable (power)	MOLEX Type 42002 3x4 pins, male, 6.35mm, vertical
XTC2	Traveling cable (safety chain and signals)	MOLEX Type 87427 2x8 pins, male, 4.2mm, vertical
XRA	Alarm relay	WAGO 3 pins, male, 7,5 mm, coded, vertical
XSAIO	Connection for additional IO board SAIO	Socket terminal strip, 16 pins, 2.54mm, vertical
XKTHMH	Motor temperature sensor PTC	WAGO 2 pins, male, 5 mm, coded, vertical
XTHMR	Machine room temperature contact	WAGO 2 pins, male, 3,5 mm, vertical
XFAN	Cooling ventilator	WAGO 2 pins, male, 3,5 mm, vertical
XLD	Load sensor	WAGO 3 pins, male, 5 mm, coded, vertical
XBIO	BioBus connection for shaft	WAGO 3 pins, male, 5 mm, coded, vertical
XBIO2	BioBus connection for second shaft side	WAGO 3 pins, male, 5 mm, coded, vertical
SKS	Safety chain hoistway	MOLEX Type 87427 2x3 pins, male, 4.2mm, vertical
SKD	Safety chain door first side	WAGO 3 pins, female, 5 mm, coded, vertical
SKD2	Safety chain door second side	WAGO 3 pins, female, 5 mm, coded, vertical
XJHM1	Safety chain stop machine room	WAGO 2 pins, female, 5 mm, coded, vertical
ESE	Connection for emergency electrical control station	MOLEX Type 87427 2x6 pins, male, 4.2mm, vertical
XSPH	Connection for SPH21 control	MOLEX Type 87427 2x7 pins, male, 4.2mm, vertical
DC-AC	Battery for automatic evacuation	WAGO 5 pins, male, 5 mm, coded, vertical
BAT	Battery for emergency power supply	WAGO 2 pins, male, 3,5 mm vertical
XCT	Main contactor kit for automatic evacuation	WAGO 8 pins, male, 3,5 mm, vertical
XCTD	Door contactor kit for automatic evacuation	WAGO 4 pins, male, 3,5 mm, vertical
XCTB	Brake contactor kit for automatic evacuation	WAGO 4 pins, male, 3,5 mm, vertical
XVF_EVAC	ACVF control for automatic evacuation	WAGO 3 pins, male, 3,5 mm vertical
XVF	ACVF control	WAGO 8 pins, female, 7,5 mm, right angle

X230	230VAC Supply	WAGO 2 pins, female, 7.5 mm, coded, vertical
XPEBO1	Connector for brake test connector	WAGO 5 pins, female, 7.5 mm, coded, vertical
XPEBO	PEBO control	WAGO 6 pins, female, 5 mm, right angle
KBV	KBV trigger control and Safety chain for speed governor	WAGO 7 pins, female, 5 mm, coded, vertical
XMVE	Motor ventilator	WAGO 2 pins, male, 3.5 mm, vertical
XDCB	HY control	JST 12 pins, female, 2.5 mm, right angle
XTELE	NOT MOUNTED (For debug purposes only)	JST 3 pins, male, 2.5 mm, vertical
BYPASS	Safety chain bypass	MOLEX Type 42002 3x3 pins, male, 6.35mm, vertical
XCLSD	RMA Beijing interface	Socket terminal strip, 10 pins, 2.54mm, vertical
XJHM1_2	Safety chain stop machine room, logical input	WAGO 2 pins, male, 5 mm, coded, vertical

3.1 SCPU1 board connector

Silkscreen: XCPU1 Type: SMD SO DIM, 144pins, vertical									
SCPU 1.Q					ECB2.Q				
Pin	Signal name	Signal name	Used as (function)	Connected on	Pin	Signal name	Signal name	Used as (function)	Connected on
1	GND	GND	ground		2	3V3	3V3	supply	
3	ETX+	TX+	Ethernet		4	ETX-	TX-	Ethernet	
5	ERX+	RX+	Ethernet		6	ERX-	RX-	Ethernet	
7	ETXEN	DEBUG_CS	debug CS	CPLD	8	ETXD[0]	DEBUG_A[5]	debug a5	CPLD
9	ETXD[1]	DEBUG_D[5]	debug d5	CPLD	10	ETXD[2]	DEBUG_D[6]	debug d6	CPLD
11	ETXD[3]	DEBUG_D[7]	debug d7	CPLD	12	ETXER	DEBUG_D[4]	debug d4	CPLD
13	EMDC	n.c.			14	EMDIO	n.c.		
15	ERXDV	DEBUG_A[2]	debug a2	CPLD	16	ERXCLK	DEBUG_A[3]	debug a3	CPLD
17	ECOL	DEBUG_A[4]	debug a4	CPLD	18	ETXCLK	DEBUG_R W	debug rw	CPLD
19	ERXD[0]	DEBUG_A[1]	debug a1	CPLD	20	ERXD[1]	DEBUG_D[1]	debug d1	CPLD
21	ERXD[2]	DEBUG_D[2]	debug d2	CPLD	22	ERXD[3]	DEBUG_D[3]	debug d3	CPLD
23	ERXER	DEBUG_D[0]	debug d0	CPLD	24	ECRS	DEBUG_A[0]	debug a0	CPLD
25	GND	GND	ground		26	3V3	3V3	supply	
27	GPTA[0]	PTA[0]	SIM reset	CPLD	28	GPTA[1]	PTA[1]	SIM clock	CPLD
29	GPTA[2]	PTA[2]	SIM out	CPLD	30	GPTA[3]	PTA[3]	SIM in	CPLD
31	GPTA[3]	CLC PTB[3]	CLC		32	n.c.	n.c.		
33	n.c.	n.c.			34	n.c.	N.C		
35	n.c.	n.c.			36	n.c.	n.c.		
37	GPTB[0]	PTB[0]	not used	CPLD	38	GPTB[1]	PTB[1]	not used	CPLD
39	GPTB[2]	PTB[2]	not used	CPLD	40	n.c.	n.c.		
41	GND	GND	ground		42	3V3	3V3	supply	
43	n.c.	n.c.			44	n.c.	n.c.		
45	n.c.	n.c.			46	AN[5]	SW_DWLD	dwInd LED	LED
47	PST[2]	PST2	BDM	CPU	48	PST[3]	PST3	BDM	CPU
49	PST[0]	PST0	BDM	CPU	50	PST[1]	PST1	BDM	CPU
51	DDATA[2]	DDATA2	BDM	CPU	52	DDATA[3]	DDATA3	BDM	CPU
53	DDATA[0]	DDATA0	BDM	CPU	54	DDATA[1]	DDATA1	BDM	CPU
55	AN[6]	RESET	reset	CPLD	56	AN[7]	MODEM_RES	CLSDR res.	CLSDR
57	CLKOUT	CLKOUT	clock	CPLD	58	TA	TA	BDM	CPU
59	n.c.	n.c.			60	n.c.	n.c.		
61	DSO	DSO	BDM	CPU	62	DSI	DSI	BDM	CPU
63	DSCLK	DSCLK	BDM	CPU	64	BKPT	BKPT	BDM	CPU
65	n.c.	n.c.			66	TCLK	TCLK	-	3V3
67	RSTI	RSTI	BDM	CPU	68	n.c.	n.c.		
69	n.c.	n.c.			70	n.c.	n.c.		
71	n.c.	n.c.			72	n.c.	n.c.		
73	n.c.	n.c.			74	n.c.	n.c.		
75	n.c.	n.c.			76	3V3	3V3	supply	
77	UR2_RX	RX2	UART2 RX	CPLD	78	UR2_TX	TX2	UART2 TX	CPLD
79	n.c.	n.c.			80	n.c.	n.c.		
81	SYNCA	n.c.			82	SYNCB	SYNCB	not used	CPLD
83	n.c.	n.c.			84	n.c.	n.c.		

85	n.c.	n.c.			86	n.c.	n.c.		
87	n.c.	n.c.			88	n.c.	n.c.		
89	n.c.	n.c.			90	n.c.	n.c.		
91	n.c.	n.c.			92	n.c.	n.c.		
93	n.c.	n.c.			94	n.c.	n.c.		
95	GND	GND	ground		96	3V3	3V3	supply	
97	UR0_TX	TX0	UART0 TX	CPLD	98	IRQ[1]	IRQ[1]	IRQ1	CPLD
99	UR0_RX	RX0	UART0 RX	CPLD	100	IRQ[2]	IRQ[2]	not used	CPLD
101	UR0_RTS	RTS0	UART0 RTS	CPLD	102	IRQ[3]	IRQ[3]	not used	CPLD
103	UR0_CTS	CTS0	UART0 CTS	CPLD	104	IRQ[4]	IRQ[4]	not used	CPLD
105	UR1_TX	TX1	UART1 TX	CPLD	106	IRQ[5]	IRQ[5]	not used	CPLD
107	UR1_RX	RX1	UART1 RX	CPLD	108	IRQ[6]	n.c.		
109	UR1_RTS	RTS1	UART1 RTS	CPLD	110	n.c.	n.c.		
111	UR1_CTS	CTS1	UART1 CTS	CPLD	112	n.c.	n.c.		
113	CANTX	CAN_TX	CAN TX	CAN	114	AN[0]	n.c.		
115	CANRX	CAN_RX	CAN RX	CAN	116	AN[1]	n.c.		
117	SCL	SCL	I2C SCL	CPLD	118	AN[2]	n.c.		
119	SDA	SDA	I2C SDA	CPLD	120	AN[3]	n.c.		
121	DTIN[0]	TDI	JTAG	JTAG	122	DTOUT[0]	TCK	JTAG	JTAG
123	DTIN[1]	TDO	JTAG	JTAG	124	DTOUT[1]	TMS	JTAG	JTAG
125	QSPI_cs[3]	QSPI_CS[3]	SPI CS 3	CPLD	126	JTAG_EN	n.c.		
127	QSPI_cs[1]	QSPI_CS[1]	SPI CS 1	CPLD	128	QSPI_cs[2]	QSPI_CS[2]	SPI CS 2	CPLD
129	QSPI_DOUT	QSPI_DOUT	SPI out	CPLD	130	QSPI_DIN	QSPI_DIN	SPI in	CPLD
131	QSPI_CS[0]	QSPI_CS[0]	SPI CS	CPLD	132	QSPI_CLK	QSPI_CLK	SPI clock	CPLD
133	GND	GND	ground		134	3V3	3V3	supply	
135	n.c.	n.c.			136	n.c.	n.c.		
137	n.c.	n.c.			138	n.c.	n.c.		
139	n.c.	n.c.			140	n.c.	n.c.		
141	n.c.	n.c.			142	n.c.	n.c.		
143	GND	GND	ground		144	3V3	3V3	supply	

Connection on ECB2 as requested from design!

3.2 CPLD JTAG connector

The JTAG connector provides the interface for programming the CPLD/FPGA directly.

Silkscreen: JTAG							
Type: SMD pin header, male, 2x5 poles, vertical, pitch 2.54mm							
PIN no.	Signal name	Description	Voltage	I _{max}	I _{short}	Safety	Signal Type
1	TCK	Test Clock Input	3.3 V	10 mA		No	T106
2	GND	Ground	0 V	10 mA		No	G104
3	TDO	Test Data Output	3.3 V	10 mA		No	T106
4	3V3	Positive Supply	3.3 V	100 mA		No	PS204
5	TMS	Test Mode Select	3.3 V	10 mA		No	T106
6	n.c.	Not Connected	-	-		-	
7	n.c.	Not Connected	-	-		-	
8	n.c.	Not Connected	-	-		-	
9	TDI	Test Data Input	3.3 V	10 mA		No	T106
10	GND	Ground	0 V	100 mA		No	G104

3.3 BDM connector (Not mounted on series product)

The BDM connector provides the interface for the main SCPU1 debugging system.

Silkscreen: BDM							
Type: PIN Header, Male, 2x13 poles, vertical, 2.54mm							
Pin	Signal name	Description	Voltage	I _{max}	I _{short}	Safety	Signal Type
1	n.c.	Not Connected	-	10 mA	-	-	
2	BKPT	Breakpoint mode	3.3V	100 mA		NO	T106
3	GND	Ground	0V	10 mA		NO	G104
4	DSCLK	Development serial clock	3.3V	100 mA		NO	T106
5	GND	Ground	0V	-		NO	G104
6	n.c.	Not Connected	-	10 mA		-	
7	RESET	Reset in	3.3V	10 mA		NO	T106
8	DSI	Development serial input	3.3V	100 mA		NO	T106
9	3.3V	Positive Supply	3.3V	10 mA		NO	PS204
10	DSO	Development serial output	3.3V	100 mA		NO	T106
11	GND	Ground	0V	10 mA		NO	G104
12	PST3	Processor status bit 3	3.3V	10 mA		NO	T106
13	PST2	Processor status bit 2	3.3V	10 mA		NO	T106
14	PST1	Processor status bit 1	3.3V	10 mA		NO	T106
15	PST0	Processor status bit 0	3.3V	10 mA		NO	T106
16	DDATA3	Debug data bit 3	3.3V	10 mA		NO	T106
17	DDATA2	Debug data bit 2	3.3V	10 mA		NO	T106
18	DDATA1	Debug data bit 1	3.3V	10 mA		NO	T106
19	DDATA0	Debug data bit 0	3.3V	100 mA		NO	T106
20	GND	Ground	0V	-		NO	G104
21	n.c.	Not Connected	-	-		-	
22	n.c.	Not Connected	-	100 mA		-	
23	GND	Ground	0V	10 mA		NO	G104
24	CLKOUT	CPU main clock	3.3V	100 mA		NO	T106
25	3.3V	Positive Supply	3.3V	10 mA		NO	PS204
26	TA	Transfer acknowledge	3.3V	10 mA		NO	T106

3.4 MMC

The MMC connector provides the interface for programming the CPLD and the CPU on the SCPU through the MMC.

Silkscreen: MMC							
Type: MMC/SD connector straight (Schindler Id.No. 55520076)							
Pin	Signal name	Description	Voltage	I _{max}	I _{short}	Safety	Signal Type
1	SPI_CS5~	MMC/SD chip select	3.3V	10 mA		NO	O100
2	SPI_OUT_cpld	MMC/SD data out	3.3V	10 mA		NO	O100
3	GND	GND	0V	100 mA		NO	G104
4	3V3	3.3 V power supply	3.3V	100 mA		NO	PS204
5	SPI_CLK_cpld	MMC/SD clock	3.3V	10 mA		NO	O100
6	GND	GND	0V	100 mA		NO	G104
7	SPI_IN_MMC	MMC/SD data in	3.3V	10 mA		NO	I100
8	-	N.U.	3.3V	10 mA		NO	
9	-	N.U.	3.3V	10 mA		NO	

3.5 CHIPCARD

The CHIPCARD connector provides the interface for the SIM card on system.

Silkscreen: SIM							
Type: Chip card connector							
Pin	Signal name	Description	Voltage	I _{max}	I _{short}	Safety	Signal Type
C1	VCC	5 V power supply	5V	100 mA		NO	PS203
C2	RST_chipcard	reset SIM card	3.3V	10 mA		NO	O101
C3	CLK_chipcard	clock SIM card	3.3V	10 mA		NO	O101
C4	n.c.	not connected	-	-		-	G104
C5	GND	ground	0V	100 mA		NO	
C6	n.c.	not connected	-	-		-	O101/I101
C7	SO_chipcard	data line SIM Card	3.3V	10 mA		NO	PS203

3.6 TELE (Not mounted on series product)

TELE connector provides the interface for debug link.

Silkscreen XTELE :							
Type: JST, 3 poles, male, vertical, pitch 2.54mm							
Pin	Signal name	Description	Voltage	I _{max}	I _{short}	Safety	Signal Type
1	TX_TELE	TX signal for the tele-alarm	+/- 12.0V	20 mA		NO	RS232
2	RX_TELE	RX signal from the tele-alarm	+/- 12.0V	20 mA		NO	RS232
3	M0	ground	0V	100 mA		NO	G104

3.7 RS232

The RS232 connector provides the interface for:

- Duplex link
- SPECI/VCOM devices

Silkscreen RS232 :							
Type: SMD DSUB9 connector, straight							
Pin	Signal name	Description	Voltage	I _{max}	I _{short}	Safety	Signal Type
1	bridge to 7	connected to pin 7	+/- 12V	10mA		NO	T105
2	RX_232	Receive data	+/- 12V	10mA		NO	RS232
3	TX_232	Transmit data	+/- 12V	10mA		NO	RS232
4	bridge to 6	connected to pin 6	+/- 12V	10mA		NO	T105
5	M0	ground	0V	100mA		NO	G103
6	bridge to 4	connected to pin 4	+/- 12V	10mA		NO	T105
7	bridge to 1	connected to pin 1	+/- 12V	10mA		NO	T105
8	n.c.	not connected	-	10 mA		-	
9	n.c.	not connected	-	10 mA		-	

3.8 XCAN_EXT

XCAN_EXT connector provides the interface for the CAN BUS to the VF.

Silkscreen XCAN_EXT :							
Type: WAGO 3 poles, male, 5 mm, coded, vertical							
Pin	Signal name	Description	Voltage	I _{max}	I _{short}	Safety	Signal Type
1	CANEXT_L	CAN signal	3.5V	100 mA		NO	CAN
2	CANEXT_H	CAN signal	3.5V	100 mA		NO	CAN
3	GND1	0V isolated	0V	100 mA		NO	G104

3.9 XETMA

XETMA connector provides the interface for the ETMA.

Silkscreen: XETMA							
Type: Modular Jack RJ45, 8 contacts, vertical							
Pin	Signal name	Description	Voltage	I _{max}	I _{short}	Safety	Signal Type
1	M0	Ground	0V	1 A	6A	NO	G103
2	TX_ETMA_232	TX signal for ETMA	+/- 12.0V	20mA		NO	RS232
3	RX_ETMA_232	RX signal from ETMA	+/- 12.0V	20mA		NO	RS232
4	P01_1	Main power supply	30V	1 A	6A	NO	PS200
5	RESET_ETMA_232	RESET signal for ETMA	+/- 12.0V	20mA		NO	RS232
6	EMER_INT_SP	+12V-Emergency power supply	15V	0.7A	0.7A	NO	PS201
7	CTS_ETMA_232	CTS signal from ETMA	+/- 12.0V	20mA		NO	RS232
8	RTS_ETMA_232	RTS signal for ETMA	+/- 12.0V	20mA		NO	RS232

3.10 XETHERNET

XETHERNET connector provides a Ethernet interface.

Silkscreen XETHERNET							
Type: Modular Jack RJ45, 8 contacts, vertical							
Pin	Signal name	Description	Voltage	I _{max}	I _{short}	Safety	Signal Type
1	TX_DE+	Ethernet signal				NO	Ethernet
2	TX_DE-	Ethernet signal				NO	Ethernet
3	RX_DE+	Ethernet signal				NO	Ethernet
4	MTT	Ethernet signal				NO	Ethernet
5	MTT	Ethernet signal				NO	Ethernet
6	RX_DE-	Ethernet signal				NO	Ethernet
7	MRT	Ethernet signal				NO	Ethernet
8	MRT	Ethernet signal				NO	Ethernet

3.11 XOVERLAY

XOVERLAY connector provides the interface for the overlay box (triplex).

Silkscreen: XOVERLAY							
Type: WAGO 5 poles, male, coded, vertical, pitch 3.5 mm							
Pin	Signal name	Description	Voltage	I _{max}	I _{short}	Safety	Signal Type
1	P0	Controller supply 24 VDC	30 VDC	1 A	6A	NO	PS200
2	M0	Ground	0 VDC	1 A	6A	NO	G103
3	CANCAR_L	CAN signal	3.5V	100 mA	0.2 A	NO	CAN
4	CANCAR_H	CAN signal	3.5V	100 mA	0.2 A	NO	CAN
5	GND1	isolated ground	0V	0.2 A	0.2 A	NO	G104

3.12 Power supply input XMAIN

Silkscreen: XMAIN							
Type: WAGO 5 poles, male, coded, vertical, pitch 7.5 mm							
Pin	Signal name	Description	Voltage	I _{max}	I _{short}	Safety	Signal Type
1	L1	Main supply phase 1	400VAC	6 A	6 A	NO	PS206
2	N	Main supply neutral	400VAC	6 A	8 A	NO	PS206
3	PE	Earth	0V	10 A	10 A	NO	G102
4	L2	Main supply phase 2	400VAC	6 A	6 A	NO	PS206
5	L3	Main supply phase 3	400VAC	6 A	6 A	NO	PS206

3.13 Phase control XRKPH

Silkscreen: XRKPH							
Type: WAGO 3 poles, male, coded, vertical, pitch 7.5 mm							
Pin	Signal name	Description	Voltage	I _{max}	I _{short}	Safety	Signal Type
1	L1_RKPH	Main supply phase 1	400VAC	6A	6A	NO	PS206
2	L2_RKPH	Main supply phase 2	400VAC	6A	6A	NO	PS206
3	L3_RKPH	Main supply phase 3 (only int. connection for phase control)	400VAC	0.1 A	-	NO	PS206

3.14 Car light power supply input XHL

Silkscreen XHL							
Type: WAGO 2 poles, male, coded, vertical, pitch 7.5 mm							
Pin	Signal name	Description	Voltage	I _{max}	I _{short}	Safety	Signal Type
1	L_LC	Car light supply phase	250 VAC	10 A	10 A	NO	T104
2	N_LC	Car light supply neutral	250 VAC	10 A	10 A	NO	T104

3.15 Door zone indicator XLUET

Silkscreen XLUET							
Type: WAGO 2 poles, male, coded, vertical, pitch 5 mm							
Pin	Signal name	Description	Voltage	I _{max}	I _{short}	Safety	Signal Type
1	LUET	LUET output signal	15 VDC	200 mA	400 mA	NO	O201
2	M0	Power Supply Common	0V	6 A	6 A	NO	G103

3.16 Phone XTT

Silkscreen XTT							
Type: WAGO 2 poles, female, coded, vertical, pitch 5 mm							
Pin	Signal name	Description	Voltage	I _{max}	I _{short}	Safety	Signal Type
1	Phone_a	Phone line	60 VDC	100 mA	100 mA	NO	T105
2	Phone_b	Phone line	60 VDC	100 mA	100 mA	NO	T105

3.17 Main switch XJH

Silkscreen XJH							
Type: WAGO 2 poles, male, vertical, pitch 3.5 mm							
Pin	Signal name	Description	Voltage	I _{max}	I _{short}	Safety	Signal Type
1	EMER_INT_SP	Emergency power supply	15 VDC	0.7 A	0.7 A	NO	PS201
2	JH_ON	Main switch	15 VDC	0.7 A	0.7 A	NO	I201

3.18 Controller MCB XJTHS

Silkscreen XJTHS							
Type: WAGO 2 poles, male, coded, vertical, pitch 3.5 mm							
Pin	Signal name	Description	Voltage	I _{max}	I _{short}	Safety	Signal Type
1	JH_ON	Main switch	15 VDC	0.7 A	0.7 A	NO	T105
2	JTHS_ON	Controller MCB	15 VDC	0.7 A	0.7 A	NO	I201

3.19 Brake voltage supply XPSU_B

Silkscreen: XPSU_B							
Type: WAGO 6 poles, female, coded, vertical, pitch 7.5 mm							
Pin	Signal name	Description	Voltage	I _{max}	I _{short}	Safety	Signal Type
1	L1_RTb_OFF	Supply phase 1	400VAC	6 A	6 A	NO	PS206
2	MGB_L_L1_POS	Brake supply	250VAC	6 A	6 A	NO	T104
3	L2	Supply phase 2	400VAC	6 A	6 A	NO	PS206
4	MGB_N_L2_NEG	Brake supply	250VAC	6 A	6 A	NO	T104
5	N	Supply neutral	400VAC	6 A	6 A	NO	PS206
6	PE	Earth	0V	10 A	10 A	NO	G102

3.20 230VAC Supply X230

Silkscreen X230							
Type: WAGO 2 poles, female, coded, vertical, pitch 7.5 mm							
Pin	Signal name	Description	Voltage	I _{max}	I _{short}	Safety	Signal Type
1	MGB_L_L1_POS	Supply phase 1	400VAC	6 A	6 A	NO	T104
2	MGB_L_L2_NEG	Supply phase 2	400VAC	6 A	6 A	NO	T104

3.21 Door supply transformer XTAT

Silkscreen: XTAT							
Type: WAGO 7 poles, female, coded, vertical, pitch 7.5 mm							
Pin	Signal name	Description	Voltage	I _{max}	I _{short}	Safety	Signal Type
1	L1	Supply phase 1	400 VAC	6 A	6 A	NO	PS206
2	OL1_L_L1	Phase door supply	400 VAC	6 A	6 A	NO	T103
3	L2	Supply phase 2	400 VAC	6 A	6 A	NO	PS206
4	OL2_N_L2	Phase/Neutral door supply	400 VAC	6 A	6 A	NO	T103
5	N	Supply neutral	400 VAC	6 A	6 A	NO	PS206
6	L3	Supply phase 3	400 VAC	6 A	6 A	NO	PS206
7	OL3	Phase door supply	400 VCA	6 A	6 A	NO	T103

3.22 Power supply unit elevator XPSU_E

Silkscreen: XPSU_E							
Type: WAGO 3 poles, female, coded, vertical, pitch 7.5 mm							
Pin	Signal name	Description	Voltage	I _{max}	I _{short}	Safety	Signal Type
1	L1_RKPH	Main supply phase 1	400VAC	6 A	6 A	NO	T103
2	L2_RKPH	Main supply phase 2	400VAC	6 A	6 A	NO	T103
3	PE	Earth	0V	10 A	10 A	NO	G102

3.23 Power supply input X24PS

Silkscreen: X24PS							
Type: WAGO 2 poles, male, vertical, coded, pitch 5mm							
Pin	Signal name	Description	Voltage	I _{max}	I _{short}	Safety	Signal Type
1	24V_PS	24VDC Power Supply	24Vdc $\pm 20\%$	6 A	6 A	NO	PS200
2	M0	Power Supply Common	0V	6 A	6 A	NO	G103

3.24 Power supply external for CANIO option X24_CAN

Silkscreen: X24_CAN							
Type: WAGO 2 poles, female, vertical, coded, pitch 5mm							
Pin	Signal name	Description	Voltage	I _{max}	I _{short}	Safety	Signal Type
1	P0	24VDC Power Supply	24Vdc $\pm 20\%$	6 A	6 A	NO	PS200
2	M0	Power Supply Common	0V	6 A	6 A	NO	G103

3.25 Power supply unit peripherals XPSU_P

Silkscreen: XPSU_P							
Type: WAGO 3 poles, female, coded, vertical, pitch 7.5 mm							
Pin	Signal name	Description	Voltage	I _{max}	I _{short}	Safety	Signal Type
1	L2	Main supply phase 1	400VAC	6 A	6 A	NO	T103
2	L3	Main supply phase 2	400VAC	6 A	6 A	NO	T103
6	PE	Earth	0V	10 A	10 A	NO	G102

3.26 Power supply biobus XAPS

Silkscreen: XAPS							
Type: WAGO 3 poles, male, vertical, coded, pitch 5mm							
Pin	Signal name	Description	Voltage	I _{max}	I _{short}	Safety	Signal Type
1	P0	24VDC Power Supply	24Vdc $\pm 20\%$	6 A	6 A	NO	PS200
2	BIOBUS_SUPPLY	24VDC Power Supply	24Vdc $\pm 20\%$	6 A	6 A	NO	PS200
3	M0	Power Supply Common	0V	6 A	6 A	NO	G103

3.27 Traveling cable for power supply XTC1

Silkscreen: XTC1							
Type: MOLEX Type 42002 3x4 poles, male, coded, vertical, pitch 6.35 mm							
Pin	Signal name	Description	Voltage	I _{max}	I _{short}	Safety	Signal Type
1	OL1_L_L1	Supply phase 1	400 VAC	6 A	6 A	NO	T103
2	OL2_N_L2	Phase door supply	400 VAC	6 A	6 A	NO	T103
3	OL3	Supply phase 2	400 VAC	6 A	6 A	NO	T103
4	-	N.U.	-	-	-	-	
5	-	N.U.	-	-	-	-	
6	-	N.U.	-	-	-	-	
7	L_LC	Car light supply phase	250 VCA	10 A	10 A	NO	T104
8	-	N.U.	-	-	-	-	
9	N_LC	Car light supply neutral	250 VCA	10 A	10 A	NO	T104
10	M0	Power Supply Common	0V	6 A	6 A	NO	G103
11	PE	Earth	0V	10 A	10 A	NO	G102
12	P03	Car power supply	24Vdc $\pm 20\%$	2.5 A	2.5 A	NO	PS200

3.28 Traveling cable for safety chain and signals XTC2

Silkscreen: XTC2							
Type: MOLEX Type 87427 2x8 poles, male, coded, vertical, pitch 4.2 mm							
Pin	Signal name	Description	Voltage	I _{max}	I _{short}	Safety	Signal Type
1	SK6	Safety chain	60 VDC	1.5 A	1.5 A	YES	T100
2	SK8	Safety chain	60 VDC	1.5 A	1.5 A	YES	T100
3	SK11	Safety chain	60 VDC	1.5 A	1.5 A	YES	T100
4	Phone_a	Phone line	60 VDC	1 A	-	NO	T105
5	EMER_EXT	Emergency power 12VDC	15 VDC	1 A	1A	NO	PS201
6	CANCAR_L	CAN signal	3.5V	100 mA	0.2 A	NO	CAN
7	GND1	0V of the CAN bus	0V	100 mA	-	NO	CAN
8	-	N.U.	-	-	-	-	
9	SK12	Safety chain	60 VDC	1 A	1.2 A	YES	T100
10	SK13	Safety chain	60 VDC	1 A	1.2 A	YES	T100
11	SK18	Safety chain	60 VDC	1 A	1.2 A	YES	T100
12	Phone_b	Phone line	60 VDC	1 A	1 A	NO	T105
13	DA	Alarm signal	15 VDC	1 A	1 A	NO	T102
14	CANCAR_H	CAN signal	3.5V	100 mA	0.2 A	NO	CAN
15	HFE	EMC ground	0V	2 A	-	NO	G3
16	LUET	LUET input signal	15 VDC	100 mA	1 A	NO	I201

3.29 Alarm relays XRA

Silkscreen: XRA							
Type: WAGO 3 poles, male, vertical, coded, pitch 7.5mm							
Pin	Signal name	Description	Voltage	I _{max}	I _{short}	Safety	Signal Type
1	RA_NO	Alarm relay NO	250VAC	4 A	4 A	NO	T104
2	RA_NC	Alarm relay NC	250VAC	4 A	4 A	NO	T104
3	RA_COM	Alarm relay COMMOM	250VAC	4 A	4 A	NO	T104

3.30 Additional IO XAIO

Silkscreen: XAIO							
Type: Socket terminal strip, 16 poles, female, vertical, pitch 2.54 mm							
Pin	Signal name	Description	Voltage	I _{max}	I _{short}	Safety	Signal Type
1	SAIO_pwr	SAIO supply 24 VDC	24Vdc $\pm 20\%$	1 A	2 A	NO	O207
2	SAIO_pwr	SAIO supply 24 VDC	24Vdc $\pm 20\%$	1 A	2 A	NO	O207
3	SAIO_pwr	SAIO supply 24 VDC	24Vdc $\pm 20\%$	1 A	2 A	NO	O207
4	SAIO_pwr	SAIO supply 24 VDC	24Vdc $\pm 20\%$	1 A	2 A	NO	O207
5	VCC	5VDC	5 VDC	200 mA	1 A	NO	PS203
6	SPI_OUT_EN_SAIO	output enable	5 VDC	20 mA	1 A	NO	O101
7	-	N.U.	-	-	-	-	
8	SPI_OUT_SAIO	MOSI to the SAIO	5 VDC	20 mA	1 A	NO	O101
9	-	N.U.	-	-	-	-	
10	GND	Ground	0 VDC	1 A	2 A	NO	G104
11	SPI_IN_SAIO	MISO from the SAIO	5 VDC	20 mA	1 A	NO	I101
12	GND	Ground	0 VDC	1 A	2 A	NO	G104
13	SPI_CS4~	SPI chip select to the SAIO	5 VDC	20 mA	1 A	NO	O101
14	GND	Ground	0 VDC	1 A	2 A	NO	G104
15	SPI_CLK_SAIO	SPI clock to the SAIO	5 VDC	20 mA	1 A	NO	O101
16	GND	Ground	0 VDC	1 A	2 A	NO	G104

3.31 Temperature PTC input XKTHMH

Silkscreen: XKTHMH							
Type: WAGO 2 poles, male, vertical, coded, pitch 5mm							
Pin	Signal name	Description	Voltage	I _{max}	I _{short}	Safety	Signal Type
1	KTHM	PTC input	5 VDC	20 mA	20 mA	NO	I205
2	M0	Ground	0 VDC	1 A	6 A	NO	G103

3.32 Temperature contact input XTHMR

Silkscreen: XTHMR							
Type: WAGO 2 poles, male, vertical, coded, pitch 3.5mm							
Pin	Signal name	Description	Voltage	I _{max}	I _{short}	Safety	Signal Type
1	THMR	Contact input	24Vdc $\pm 20\%$	20 mA	20 mA	NO	I214
2	M0	Ground	0 VDC	6 A	6 A	NO	G103

3.33 Cooling fan XFAN

Silkscreen: XFAN							
Type: WAGO 2 poles, male, vertical, coded, pitch 3.5mm							
Pin	Signal name	Description	Voltage	I _{max}	I _{short}	Safety	Signal Type
1	P0	24VDC Power Supply	24Vdc $\pm 20\%$	6 A	6 A	NO	PS200
2	FAN	Fan driver	0 VDC	2 A	2 A	NO	O201

3.34 Motor ventilator XMVE

Silkscreen XMVE							
Type: WAGO 2 poles, male, vertical, coded, pitch 3.5mm							
Pin	Signal name	Description	Voltage	I _{max}	I _{short}	Safety	Signal Type
1	P0	24VDC Power Supply	24Vdc $\pm 20\%$	6 A	6 A	NO	PS200
2	MVE	Motor fan driver	0 VDC	2 A	2 A	NO	O201

3.35 Load sensor XLD

Silkscreen: XLD							
Type: WAGO 3 poles, male, vertical, coded, pitch 5mm							
Pin	Signal name	Description	Voltage	I _{max}	I _{short}	Safety	Signal Type
1	VCC2	CLC Supply 5 VDC	30 VDC	1 A	1 A	NO	O206
2	CLC	Load Cell / Overload	5 VDC	20 mA	20 mA	NO	I101
3	M0	Ground	0 V	1 A	6 A	NO	G103

3.36 BIOBUS first access side XBIO

Silkscreen: XBIO							
Type: WAGO 3 poles, male, vertical, coded, pitch 5mm							
Pin	Signal name	Description	Voltage	I _{max}	I _{short}	Safety	Signal Type
1	M0	Ground	0 VDC	6 A	6 A	NO	G103
2	BBUS	Biobus IO	24VDC	0.5A	0.5 A	NO	I215/O201
3	BIOBUS_SUPPLY	BioBus supply	30 VDC	6A	6 A	NO	PS200

3.37 BIOBUS second access side XBIO2

Silkscreen: XBIO2							
Type: WAGO 3 poles, male, vertical, coded, pitch 5mm							
Pin	Signal name	Description	Voltage	I _{max}	I _{short}	Safety	Signal Type
1	M0	Ground	0 VDC	6 A	6 A	NO	G103
2	BBUS	Biobus IO	24VDC	0.5A	0.5 A	NO	I215/O201
3	BB_SUPPLY	BioBus supply	30 VDC	6A	6 A	NO	PS200

3.38 Safety Chain Stop Machine Room XJHM1

Silkscreen: XJHM1							
Type: WAGO 2 poles, female, vertical, coded, pitch 5mm							
Pin	Signal name	Description	Voltage	I _{max}	I _{short}	Safety	Signal Type
1	SK3	Safety chain	60 VDC	1 A	1.2 A	YES	T100
2	SK4	Safety chain	60 VDC	1 A	1.2 A	YES	T100

3.39 Stop Button in machine Room Logical Input XJHM1_2

Silkscreen: XJHM1_2							
Type: WAGO 2 poles, male, vertical, coded, pitch 5mm							
Pin	Signal name	Description	Voltage	I _{max}	I _{short}	Safety	Signal Type
1	N_JHM_2	-	30 VDC	-	6 A	NO	T107
2	N_JHM	-	30 VDC	20 mA	-	NO	I200

3.40 Safety contact shaft SKD

Silkscreen: SKD							
Type: WAGO 3 poles, female, vertical, coded, pitch 5mm							
Pin	Signal name	Description	Voltage	I _{max}	I _{short}	Safety	Signal Type
1	SK12	Safety chain	60 VDC	1 A	1.2 A	YES	T100
2	SK14	Safety chain	60 VDC	1 A	1.2 A	YES	T100
3	SK2_SPH	Safety chain	60 VDC	1 A	1.2 A	YES	T100

3.41 Safety contact shaft SKD2

Silkscreen: SKD2							
Type: WAGO 3 poles, female, vertical, coded, pitch 5mm							
Pin	Signal name	Description	Voltage	I _{max}	I _{short}	Safety	Signal Type
1	SK14	Safety chain	60 VDC	1 A	1.2 A	YES	T100
2	SK16	Safety chain	60 VDC	1 A	1.2 A	YES	T100
3	SK17	Safety chain	60 VDC	1 A	1.2 A	YES	T100

3.42 BYPASS

Silkscreen: BYPASS							
Type: MOLEX, 10-84-4090, Schindler ID 432734							
Pin	Signal name	Description	Voltage	I _{max}	I _{short}	Safety	Signal Type
1	SK6	Safety chain	60 VDC	1 A	1.2 A	YES	T100
2	SK6B	Safety chain	60 VDC	1 A	1.2 A	YES	T100
3	SK12	Safety chain	60 VDC	1 A	1.2 A	YES	T100
4	SK14	Safety chain	60 VDC	1 A	1.2 A	YES	T100
5	24V_JUEKTx	Supply for bypass detection	30VDC	400 mA	400mA	NO	O200
6	SK15	Safety chain	60 VDC	1 A	1.2 A	YES	T100
7	N_JUEKTC	KTC bypass signal input	30VDC	20mA	-	YES*)	I200
8	N_JUEKTS	KTS bypass signal input	30VDC	20mA	-	YES*)	I200
9	SK18	Safety chain	60 VDC	1 A	1.2 A	YES	T100

3.43 RMA Beijing XCLSD

Silkscreen: XCLSD							
Type: SMD Pin Socket Straight 10P 1-Row Solder, Schindler ID 433595							
Pin	Signal name	Description	Voltage	I _{max}	I _{short}	Safety	Signal Type
1	TX_CLSD	UART TX	3,3VDC	10mA	-	NO	O100
2	RX_CLSD	UART RX	3,3VDC	10mA	-	NO	I100
3	RST_CLSD~	reset	3,3VDC	10mA	-	NO	O100
4	n.c.						
5	GND		0VDC	6 A	6 A	NO	G104
6	P01		24VDC	2 A	6 A	NO	PS200
7	3V3		3,3VDC	100 mA	500 mA	NO	PS204
8	RTS_CLSD	UART RTS	3,3VDC	10mA	-	NO	O100
9	CTS_CLSD	UART CTS	3,3VDC	10mA	-	NO	I100
10	n.c.						

3.44 KBV trigger

Silkscreen: KBV							
Type: WAGO 7 poles, female, vertical, coded, pitch 5mm							
Pin	Signal name	Description	Voltage	I _{max}	I _{short}	Safety	Signal Type
1	SK5	Safety chain	60 VDC	1 A	1.2 A	YES	T100
2	SK6	Safety chain	60 VDC	1 A	1.2 A	YES	T100
3	MGBV_24VDC	Magnet supply	30 VDC	4A	6A	NO	T107
4	M0	Ground	0 VDC	6 A	6 A	NO	G103
5	n.c.	Not connected	-	-	-	-	-
6	KBV1		24 VDC	1 A	1 A	YES	T100
7	KBV2		24 VDC	1 A	1 A	YES	T100

3.45 Safety Chain Hoistway SKS

Silkscreen: SKS							
Type: MOLEX, 0039-28-1063, Schindler ID 55521365							
Pin	Signal name	Description	Voltage	I _{max}	I _{short}	Safety	Signal Type
1	SK4	Safety chain	60 VDC	1 A	1.2 A	YES	T100
2	SK9	Safety chain	60VDC	1 A	1.2 A	YES	T100
3	SK5	Safety chain	60VDC	1 A	1.2 A	YES	T100
4	SK6	Safety chain	60VDC	1 A	1.2 A	YES	T100
5	SK8	Safety chain	60VDC	1 A	1.2 A	YES	T100
6	SK10	Safety chain	60VDC	1 A	1.2 A	YES	T100

3.46 Recall control station XESE

Silkscreen: XESE							
Type: MOLEX Type 87427 2x6 pins, male, 4.2mm, vertical							
Pin	Signal name	Description	Voltage	I _{max}	I _{short}	Safety	Signal Type
1	SK2	Safety chain	60 VDC	1 A	1.2 A	YES	T100
2	SK3	Safety chain	60 VDC	1 A	1.2 A	YES	T100
3	SK7	Safety chain	60 VDC	1 A	1.2 A	YES	T100
4	SK8	Safety chain	60 VDC	1 A	1.2 A	YES	T100
5	SK10	Safety chain	60 VDC	1 A	1.2 A	YES	T100
6	SK11	Safety chain	60 VDC	1 A	1.2 A	YES	T100
7	P0	24VDC Power Supply	24Vdc ±20%	6 A	6 A	NO	PS200
8	N_JHM_2	Emergency stop input	24Vdc ±20%	6 A	6 A	NO	T107
9	N_JRH	Recall on input	24Vdc ±20%	20 mA	-	NO	I200
10	DRH_U	Recall up input	24Vdc ±20%	20 mA	-	NO	I200
11	DRH_D	Recall down input	24Vdc ±20%	20 mA	-	NO	I200
12	M0	Ground	0 VDC	6 A	6 A	NO	G103

3.47 SPH21 interface XSPH

Silkscreen: XSPH							
Type: MOLEX Type 87427 2x7 poles, male, vertical, coded, pitch 4.2mm							
Pin	Signal name	Description	Voltage	I _{max}	I _{short}	Safety	Signal Type
1	SK1	Safety chain	60VDC	1 A	1.2 A	YES	T100
2	SK2	Safety chain	60VDC	1 A	1.2 A	YES	T100
3	SK2_SPH	Safety chain	60VDC	1 A	1.2 A	YES	T100
4	SK18	Safety chain	60VDC	1 A	1.2 A	YES	T100
5	SK19	Safety chain	60VDC	1 A	1.2 A	YES	T100
6	P0	24VDC Power Supply	24Vdc ±20%	6 A	6 A	NO	PS200
7	N_SPH	Recall on input in	24VDC	20mA	-	NO	I200
8	KBV2	Overspeed governor out	60VDC	1 A	1 A	YES	T100
9	KBV2S	Overspeed governor in	60VDC	1 A	1 A	YES	T100
10	EMER_EXT_SPH	Emergency power 12VDC SPH	12VDC	200mA	400 mA	NO	PS201
11	M0	Ground	0VDC	6 A	6 A	NO	G103
12	KNET		24VDC	20mA	-	NO	I200
13	SK6B		60VDC	1 A	1.2 A	YES	T100
14	SK7		60VDC	1 A	1.2 A	YES	T100

3.48 Battery and DC/DC converter DC-AC

Silkscreen: XDC_AC							
Type: WAGO 5 poles, male, vertical, coded, pitch 5mm							
Pin	Signal name	Description	Voltage	I _{max}	I _{short}	Safety	Signal Type
1	BAT-	12V battery negative	0 VDC	10 A	10 A	NO	P207
2	12V_BAT+	12V battery positive	12Vdc $\pm 20\%$	10 A	10 A	NO	P207
3	24V_BAT+	24V battery positive	24Vdc $\pm 20\%$	6,3 A	6,3 A	NO	P207
4	INV_ON1	Dry contact activation DC/AC converter (RAE)	30 VDC	1 A	1 A	NO	T105
5	INV_ON	Dry contact activation DC/AC converter (RAE)	30 VDC	1 A	1 A	NO	T105

3.49 Battery connector XBAT

Silkscreen: XBAT							
Type: WAGO 2 poles, male, vertical, coded, pitch 3.5mm							
Pin	Signal name	Description	Voltage	I _{max}	I _{short}	Safety	Signal Type
1	12V_BAT+	12V battery positive	12Vdc $\pm 20\%$	10 A	10 A	NO	P207
2	BAT-	12V battery negative	0 VDC	10 A	10 A	NO	P207

3.50 Main contactor kit for evacuation XCT

Silkscreen: XCT							
Type: WAGO 8 poles, male, vertical, coded, pitch 3.5mm							
Pin	Signal name	Description	Voltage	I _{max}	I _{short}	Safety	Signal Type
1	P0_AE_EVAC	Controller supply 24 VDC during evacuation	24Vdc $\pm 20\%$	6A	6 A	NO	PS200
2	FB_SNx	SNx feedback	24Vdc $\pm 20\%$	1A	6A	NO	T105
3	FB_SEF_B	SEF+STAT+STB feedback	24Vdc $\pm 20\%$	1A	6A	NO	T105
4	VSNX	SNx control	24Vdc $\pm 20\%$	1A	6A	NO	O201
5	P0_AE_NORMAL	Controller supply 24 VDC during normal operation	24Vdc $\pm 20\%$	6A	6A	NO	PS200
6	FB_SEF	SEF feedback	12Vdc or 24Vdc $\pm 20\%$	1A	6A	NO	T105
7	FB_SNx	SNx control	24Vdc $\pm 20\%$	1A	6A	NO	T105
8	VSEF	SEF control	24Vdc $\pm 20\%$	1A	6A	NO	O201

3.51 Brake contactor kit for evacuation XCTB

Silkscreen: XCTB							
Type: WAGO 4 poles, male, vertical, coded, pitch 3.5mm							
Pin	Signal name	Description	Voltage	I _{max}	I _{short}	Safety	Signal Type
1	FB_SEF_D	SEF+STAT feedback	24Vdc $\pm 20\%$	1A	6 A	NO	T105
2	FB_SEF_B	SEF+STAT+STB feedback	24Vdc $\pm 20\%$	1A	6 A	NO	T105
3	FB_SNx	SNx feedback	24Vdc $\pm 20\%$	1A	6 A	NO	T105
4	VSEF	SEF control	24Vdc $\pm 20\%$	1A	6 A	NO	O201

3.52 Door contactor kit for evacuation XCTD

Silkscreen: XCTD							
Type: WAGO 4 poles, male, vertical, coded, pitch 3.5mm							
Pin	Signal name	Description	Voltage	I _{max}	I _{short}	Safety	Signal Type
1	FB_SEF	SEF feedback	12Vdc or 24Vdc $\pm 20\%$	1A	6 A	NO	T105
2	FB_SEF_D	SEF+STAT feedback	24Vdc $\pm 20\%$	1A	6 A	NO	T105
3	FB_SNx	SNx feedback	24Vdc $\pm 20\%$	1A	6 A	NO	T105
4	VSEF	SEF control	24Vdc $\pm 20\%$	1A	6 A	NO	O201

3.53 ACVF evacuation control XVF_EVAC

Silkscreen: XVF_EVAC							
Type: WAGO 3 poles, male, vertical, coded, pitch 3.5mm							
Pin	Signal name	Description	Voltage	I _{max}	I _{short}	Safety	Signal Type
1	24V-VF	VF DC Power supply	24Vdc $\pm 20\%$	100 mA	-	NO	NO
2	FEF-VF	Start/Stop (EVAC drive)	24Vdc $\pm 20\%$	100 mA	-	NO	O213
3	LUET-VF	Stop at floor (EVAC drive)	24Vdc $\pm 20\%$	100 mA	-	NO	O213

3.54 Frequency converter interface XVF

Silkscreen: XVF							
Type: WAGO 8 poles, female, right angle, coded, pitch 7.5mm							
Pin	Signal name	Description	Voltage	I _{max}	I _{short}	Safety	Signal Type
1	MGB_L_L1_POS	Brake supply	400 VAC	6A	6 A	NO	T104
2	MGB_N_L2_POS	Brake supply	400 VAC	1A	6A	NO	T104
3	PEBO_NEG	PEBO negative output for MGB	400 VAC	1A	< 0.9 A	NO	T104
4	PEBO_POS	PEBO positive output	400 VAC	1A	< 1.8 A	NO	T104
5	PEBO1_NEG	PEBO negative output for MGB1	400 VAC	6A	< 0.9 A	NO	T104
6	SK19	Safety chain end	60 VDC	1 A	1.2 A	YES	T100
7	M01	Safety chain Ground	0V	6 A	6 A	NO	G103
8	P0	Controller supply 24 VDC	24Vdc $\pm 20\%$	6 A	6 A	NO	PS200

3.55 Brake test XPEBO1

Silkscreen: XPEBO1							
Type: WAGO 5 poles, male, vertical, coded, pitch 7.5mm							
Pin	Signal name	Description	Voltage	I _{max}	I _{short}	Safety	Signal Type
1	MGB_L_L1_POS	Brake supply	400 VAC	6A	6 A	NO	T104
2	MGB_N_L2_NEG	Brake supply	400 VAC	1A	6A	NO	T104
3	PEBO_NEG	PEBO negative output for MGB	400 VAC	1A	< 0.9 A	NO	T104
4	PEBO_POS	PEBO positive output	400 VAC	1A	< 1.8 A	NO	T104
5	PEBO1_NEG	PEBO negative output for MGB1	400 VAC	6A	< 0.9 A	NO	T104

3.56 PEBO connector XPEBO

Silkscreen: XPEBO							
Type: WAGO 6 poles, female, right angle, pitch 5mm							
Pin	Signal name	Description	Voltage	I _{max}	I _{short}	Safety	Signal Type
1	12V_BAT+	12V battery positive	12Vdc $\pm 20\%$	10 A	10 A	NO	PS201
2	BAT-	12V battery negative	0 VDC	10 A	10 A	NO	PS201
3	KBV1	Overspeed governor out	15 VDC	1 A	1 A	NO	T100
4	KBV2S	Overspeed governor in	15 VDC	1 A	1 A	NO	T100
5	LUET_PEBO	LUET signal	15 VDC	100 mA	1 A	NO	O202
6	+12V_JEM	Emergency power recovery	15 VDC	1 A	1 A	NO	PS201

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3.57 Hydraulic board connector XDCB

Silkscreen: XDCB							
Type: JST, 12 poles, female, right angle, pitch 2.54 mm							
Pin	Signal name	Description	Voltage	I _{max}	I _{short}	Safety	Signal Type
1	VCC	Logic supply	5 VDC	250 mA	1 A	NO	PS203
2	SPI_CLK_HY	SPI clock to the DCBHY1	5 VDC	1 A	2 A	NO	O101
3	SPI_CS1~	SPI chip select to the DCBHY1	5 VDC	1 A	2 A	NO	O101
4	SPI_OUT_HY	MOSI to the DCBHY1	5 VDC	1 A	2 A	NO	O101
5	SPI_OUT_EN_HY	Enable to the DCBHY1	5 VDC	1 A	1 A	NO	O101
6	SPI_IN_HY	MISO from the DCBHY1	5 VDC	1 A	1 A	NO	I101
7	GND	Ground	0 VDC	1 A	-	NO	G104
8	-	N.U.	-	-	-		
9	KTHM	PTC input	5 VDC	20 mA	-	NO	I205
10	HW_ID1	HW identifier bit 1	5 VDC	20 mA	-	NO	I101
11	HW_ID2	HW identifier bit 2	5 VDC	20 mA	-	NO	I101
12	HW_ID3	HW identifier bit 3	5 VDC	20 mA	-	NO	PS203

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4 Signal type definition

4.1 Used Signal Types (input, output, power supply etc.)

This table describes all used input types on this PCBA.

Input Type	Voltage Level	Low at	High at	Current	Pull-up	Pull-down	Safety relevant	Characteristics
I100	3,3VDC	0,8VDC	2,0VDC	<10µA			NO	3,3V LVTTTL compatible input
I101	5VDC	0,8VDC	2,0VDC	<10µA			NO	5V TTL compatible input
I200	24VDC	8VDC	12VDC			10mA@24VDC	NO	Hysteretic
I201	12VDC	4VDC	8VDC			10mA@12VDC	NO	Hysteretic
I205	5VDC						NO	Input signal from temperature measurement with PTC
I214	24VDC	8VDC	12VDC		10mA@24VDC		NO	Hysteretic
I215	24VDC	8VDC	12VDC		current source 500mA		NO	Hysteretic, for BIOBUS

This table describes all used output types on this PCBA.

Output Type	Voltage Level	Low at	High at	Source/ Sink	Current I _{nominal} /I _{peak} (5sec)	Default Value	Safety relevant	Characteristics
O100	3,3VDC	< 0,4VDC	>2,4VDC	push/pull	8mA	-	NO	3.3V LVTTTL compatible
O101	5VDC	< 0,4VDC	>2,4VDC	push/pull	8mA	-	NO	5V TTL compatible
O200	24VDC		PI-1V@400mA	source	400mA/500mA	inactive	NO	short circuit protected
O201	24VDC	<0,1V@400mA		sink	400mA/1,7A	inactive	NO	short circuit protected
O202	24VDC	<0,2V@200mA		sink	200mA/400mA	inactive	NO	-
O206	5VDC		PI-0,3V@200mA	source	200mA/300mA	inactive	NO	short circuit protected
O207	24VDC		PI-0,5V@700mA	source	700mA	inactive	NO	short circuit protected, current limitation
O213	24V		PI-1V@50mA	source	50mA	inactive	NO	galvanic insulated

This table contains all used power supply on this PCBA.

Power Supply Type	Voltage	Tolerance	Max. current	Short circuit current	Safety relevant	Characteristics
PS200	24VDC		6A		NO	External power P0.
PS201	12VDC		1,6A		NO	Internal power VDD
PS203	5V	±10%	1A	1,5A	NO	Clean 5VDC supply for external components
PS204	3,3V	±10%	0,5A	0,5A	NO	Clean 3,3VDC supply for external components
PS206	400VDC	±15%	6A		NO	400V main supply
PS207	24VDC	±30%	10A		NO	Battery connection

This table contains all used ground.

Ground Type	Voltage	Tolerance	Max. current	Short circuit current	Safety relevant	Characteristics
G3	0V		-	-	NO	„HFE“ High Frequency Earth DIRTY
G102	0V		10A		NO	„PE“ Protection earth
G103	0V		6A		NO	„M0“ System Ground DIRTY
G104	0V		6A		NO	„GND“ Digital and system Ground CLEAN

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This table contains all used Tracks (also tracks via relay).

Ground Type	Voltage	Tolerance	Max. current	Short circuit current	Safety relevant	Characteristics
T100	60VDC		1 A	1.2 A	YES	Safety chain (overcurrent protection on the power supply set to max 1.2A)
T102	24VDC	30VDC	2,5A		NO	Standard through wired signal 2,5A
T103	400VAC		6 A		NO	High voltage
T104	250VAC		6 A		NO	High voltage
T105	24VDC	30VDC	1A		NO	Standard through wired signal 1A
T106	5VDC	5VDC	500mA		NO	Standard through wired signal 500mA
T107	24VDC	30VDC	6		NO	Standard through wired signal 6A

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5 Mechanical Data

- PCB size: 370mm by 210mm
- PCB height: component top side = 90 mm, component bottom side = 4mm
- PCB weight: 550g

6 Clearance and creepage distance

To fulfill EN81-20 the following minimum distance for safety signals and 230VAC supply are used:

	Clearance 2000m	Clearance 4000m	Creepage PCBA outer layers and components	Creepage PCBA inner layers
Safety Circuit 63V	0.8 mm	1.032 mm	2 mm	1.25 mm
230 VAC	3 mm	3.87 mm	5 mm	4.2 mm

Exception:

Assumed that on the ECB2 is not possible to lose the ground reference, the distance between safety circuits and HFE/M0 can be reduced, allowing to place the standard 0805 filter capacitors.

7 Environmental Conditions

- Temperature: minimal = 0 °C, maximal = 60 °C
- Relative Humidity:
- Altitude : up to 2000m above sea level

8 Climatic Test

Qualification tests are done on PCBA level. They must be performed according the document "PCBA Qualification Test – Climate Test" 1.

The PCBA at system level fulfill the Schindler Standard for climatic tests according the document "Specification Environmental Test – Climate" 2.

3.2.1. Operation Heat

3.2.3 Operation Cold

3.3.1 Endurance test

3.3.2 Limit test

3.4 Climate Tests required by EN81

9 Lifetime and Reliability Parameters

Mean Time between Failure: MTBF $\geq 103'302$ hrs, FR = 9.97 fpmh.

Conditions according MIL-HDBK-217F: Ground Benign (GB) Temperature = 25°C