

BCX.3clu

BCX body control units

KEY FEATURES

- 2 in 1 control and power distribution in one unit
- Easily adaptable to customer requirements
- Flexible programming in CODESYS V3.5 IEC61131, C programming on request
- Monitoring of fuses, relays; error messages via CAN bus
- Low wiring effort
- Integration into the vehicle network

TECHNICAL DATA

- TriCore TC 1798 32bit, 300MHz
- 288 kB SRAM internal
- 8 MB SDRAM external
- 4 MB Flash internal
- 32 kB EEPROM
- 4 CAN interfaces (CAN 4 via relay base) or 3 CAN interfaces and 1 RS485 interface, 1 RS232 interface, and 1 Ethernet interface
- 49 inputs
- 78 outputs

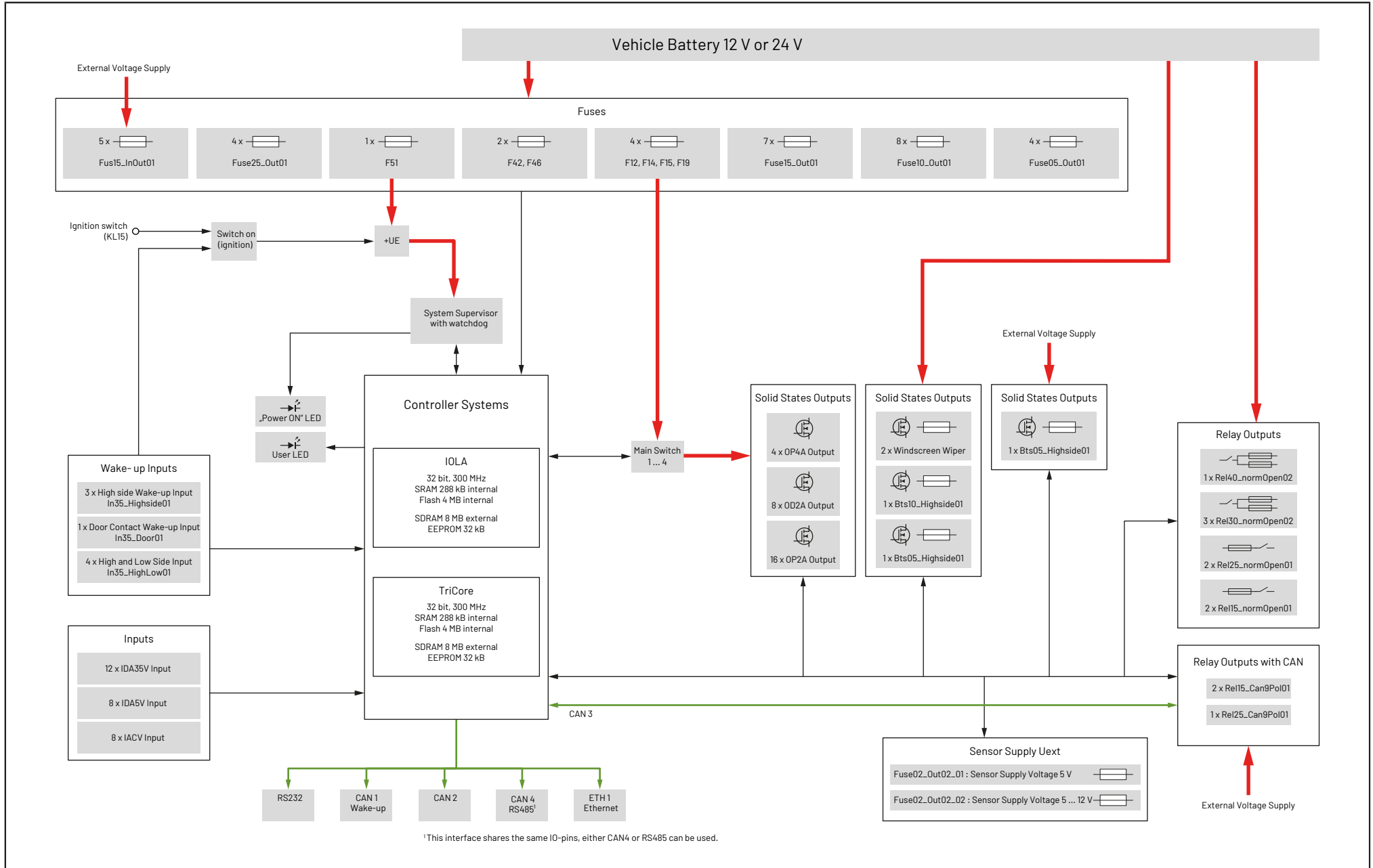
ACCESSORIES

- Mating connector
- Break out Box
- IEC 61131-3 CODESYS V3.5 Package
- Step-files
- User Manual

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BLOCK DIAGRAM



TECHNICAL DATA

Processor an memory

Type	Properties	Description
TriCore TC1798	32 bit, 300 MHz, multicore	<ul style="list-style-type: none"> External system supervisor with programmable watchdog 12 bit A/D converter for analog signal processing
SRAM	128 kB internal	<p>On-chip RAM of the TriCore.</p> <p>This memory is used for system and application data. The space available for the customer application depends on the configuration of the system.</p>
DSPRAM	128 kB internal	<p>On-chip RAM of the TriCore without wait states.</p> <p>This memory mainly serves as system memory for BIOS stack and data, but also includes a heap for the customer application.</p>
SDRAM	8 MB external	<p>7.8 MB available for customer application in C</p> <p>3 MB available for customer application in CODESYS</p>
Flash	4 MB internal	<p>3.75 MB available for customer application in C</p> <p>2 MB available for customer application in CODESYS</p>
EEPROM	32 kB	<p>24 kB available for customer application</p> <p>typical endurance according to manufacturer:</p> <ul style="list-style-type: none"> 1,000,000 erase/program cycles @ 25 °C 300,000 erase/program cycles @ 85 °C data retention > 20 years

Communication interfaces

Type	Maximal available counts	Configuration
CAN	4	<p>CAN 2.0 B, high-speed and low-speed, baud rate from 40 kbit/s to 1 Mbit/s</p> <p>CAN bus 1 with ECU wake-up feature</p> <p>CAN bus 3: Only used internally</p> <p>CAN bus 4: Configurable as CAN- or RS485-interface</p>
RS485	1	CAN 4 configured as RS485 interface: Baud rate up to 115 kbit/s, half-duplex communication, in parallel to CAN bus 4, can be used as RS485 or CAN bus
RS232	1	Baud rate up to 115 kbit/s
Ethernet	1	10/100 Mbit/s, hardware variant with additional connector

TECHNICAL DATA

Inputs

Type	Maximal available counts	Possible configuration	Measurement
Multi Functional Input IDA35V	12	Analog voltage	0 ... 35 V
		Programmable pull-up resistor to +8.5V	1.1 k Ω
		Programmable pull-down resistor to GND	1 k Ω
		NAMUR sensor compatible	
		Digital	High and low active
		Event driven	Events, reacts on falling or rising edge of the signal
		Frequency	0.6 Hz ... 20 kHz
Analog Input IACV	8	Incremental encoder interface	Change of position or angular change
		Analog voltage	0 ... 12 V
		Analog current	0 ... 25 mA
		Digital (voltage mode)	High and low active
Multi Functional Input IDA5V	8	Event driven	Events, reacts on falling or rising edge of the signal
		Analog voltage	0 ... 5 V
		Programmable pull-up resistor to +5V	6.8 k Ω
		Digital	High and low active
		Event driven	Events, reacts on falling or rising edge of the signal
Digital Wake-up Input InXX_Highside01	3	Frequency	0.6 Hz ... 20 kHz
		SENT interface	
		Digital	High active
		Digital Wake-up Input InXX_Door01	1
Digital Input InXX_HighLow01	4	Digital	High and low active

TECHNICAL DATA

Outputs

Type	Maximal available counts	Possible configuration	Range	Characteristics	Feature
Digital/PWM Output OP4A	4	Digital	–	ON/OFF	<ul style="list-style-type: none"> • High side switch • Precise current measurement, accuracy is 2 % • Supports current control mode • Digital feedback, open load detection in OFF state • Automated shutdown on overcurrent > 7.5 A ±20 % • Combine several outputs for parallel operation up to 15 A
		PWM	0 ... 4 A	0 ... 100 % duty cycle resolution < 0.1 % PWM frequency 20 ... 1000 Hz	
Digital/PWM Output OP2A	16	Digital	–	ON/OFF	<ul style="list-style-type: none"> • High side switch • Precise current measurement, accuracy is 2 % • Supports current control mode • Digital feedback, open load detection in OFF state • Automated shutdown on overcurrent > 4.6 A ±20 % • Combine several outputs for parallel operation up to 15 A
		PWM	0 ... 2.5 A	0 ... 100 % duty cycle resolution < 0.1 % PWM frequency 20 ... 1000 Hz	
Digital Output OD2A	8	Digital	–	ON/OFF	<ul style="list-style-type: none"> • High side switch • Optimized for digital operation mode (ON/OFF) • Current feedback, measurement accuracy is ±15.0 % (gain) ±100mA (offset) • Output voltage feedback, voltage measurement with ±3 % • Automated shutdown on overcurrent > 3.6 A ±20 % • Combine several outputs for parallel operation up to 15 A
		PWM	0 ... 2.5 A	0 ... 100 % duty cycle resolution < 0.1 % PWM frequency 20 ... 1000 Hz	

TECHNICAL DATA

Outputs

Type	Maximal available counts	Possible configuration	Range	Characteristics	Feature
Sensor supply U _{ext}	2	Programmable	5 ... 12 V ±2.5%	Programmable output needs derating for output voltages U _{EXT} < 10 V: $I_{MAX} = 0.9 / (13.6 - U_{EXT})$ A	<ul style="list-style-type: none"> The U_{ext} output voltage is stable also when the +UE input voltage is below the U_{ext} output voltage. E.g. it is possible to use U_{ext} = 12 V when +UE is at the min voltage +UE_{MIN} = 8 V
		Fixed voltage	5 V ±1.0%	Maximal output current I _{MAX} = 250 mA	
Main Switch	4	—	—	ON/OFF	<ul style="list-style-type: none"> Switches the four output groups High side switch Current up to 15 A
Fused constant voltage FuseXX_ Out01	4	—	Maximum 25 A	—	Supplied with X1 KL30
	7	—	Maximum 15 A	—	
	8	—	Maximum 10 A	—	
	3	—	Maximum 5 A	—	
Fused voltage FuseXX_ InOut01	5	—	Maximum 15 A	—	External voltage can be fused
High current relay RelXX_ normOpen02	1	Digital	Maximum 40 A	ON/OFF	One relay with 2 outputs (20 A each)
	3	Digital	Maximum 30 A	ON/OFF	One relay with 2 outputs (15 A each)
High current relay RelXX_ normOpen01	2	Digital	Maximum 25 A	ON/OFF	—
	2	Digital	Maximum 15 A	ON/OFF	—
RelXX_ Can9Pol01	1	Arbitrary	Maximum 25 A	—	<ul style="list-style-type: none"> 9 pole socket with arbitrary function CAN connection present Intelligent modules possible
	2	Arbitrary	Maximum 15 A	—	

TECHNICAL DATA

Outputs

Type	Maximal available counts	Possible configuration	Range	Characteristics	Feature
High current semiconductor outputs BtsXX_ Highside01	1	Digital	Maximum 10 A	ON/OFF	—
BtsXX_ Half	2	Digital	Maximum 5 A	ON/OFF	—
Bridge01	3	Digital	Maximum 10 A	ON/OFF	High side output with breaking function (for example wiper)

TECHNICAL DATA

Mechanical Data

Component	Description	Value
Connector	X1	Power bolt M10x16
	X2 ... X8	See Applicable Connectors
	ETH1	4 pins M12 connector, D-coded
Indicators	2 LED, dual color (red/green or mixed colors)	1 for the state of the system, 1 freely programmable
Housing	Aluminum die casting	
Weight	-	1,6 kg / 3,53 lbs
Degree of protection	-	IP30
Dimensions	Variant without Ethernet connector	248 mm x 191 mm x 78,4 mm
	Variant with Ethernet connector	262 mm x 191 mm x 78,4 mm
Operating temperature	Chassis temperature	-40 °C ...+85 °C / -40 °F ... 185 °F

Applicable Connectors

STW provides the following applicable mating connectors:

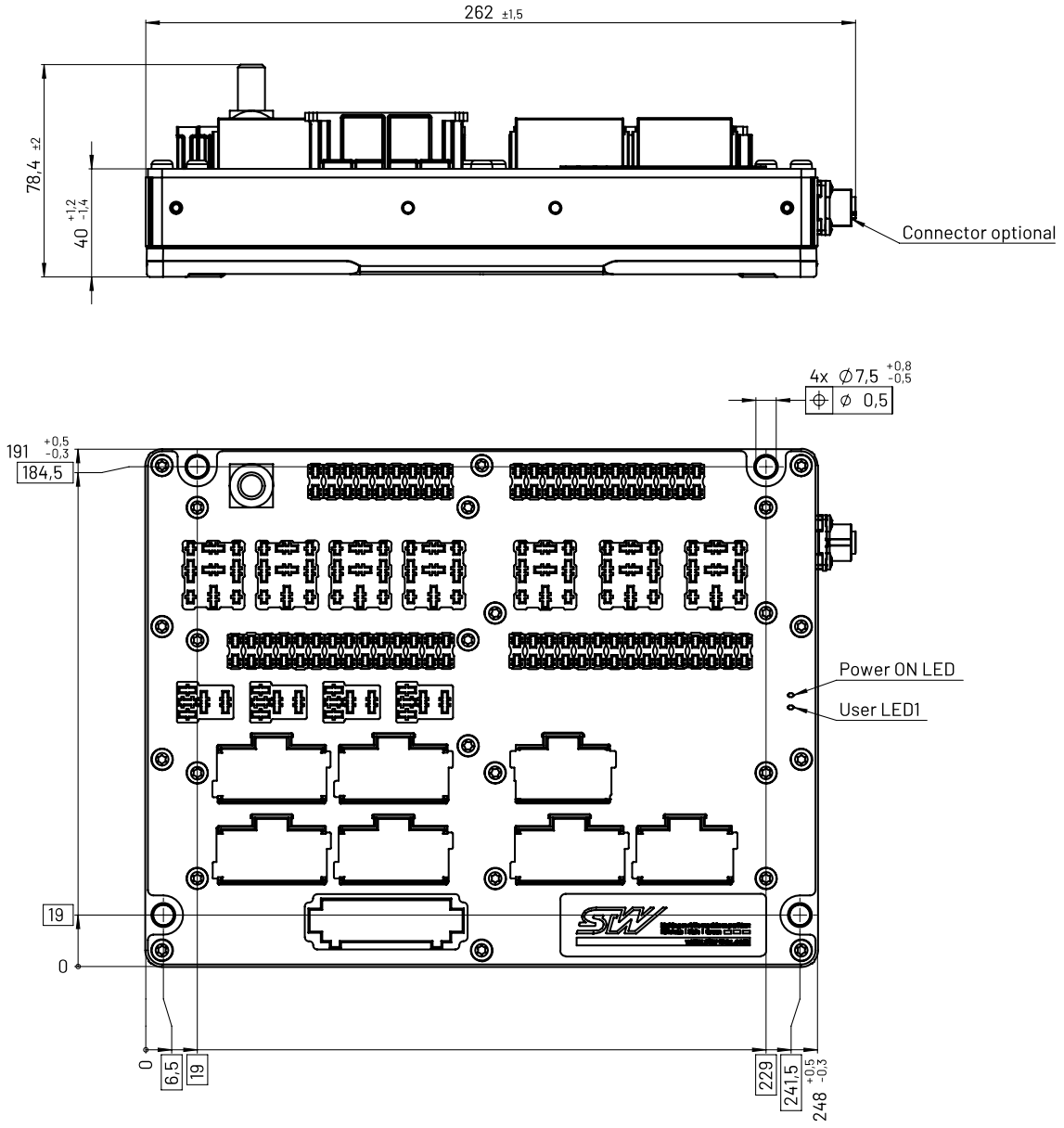
STW part number	Description	Mates with connector
86256	JPT 21 pins purple	X3
86266	JPT 21 pins green	X2
86267	JPT 21 pins yellow	X6
86268	JPT 21 pins blue	X5
86269	JPT 21 pins brown	X7
86276	JPT 18 pins white	X4
86279	JPT 18 pins gray	X8
86306	GHW 14866 12 pins black	X9

TECHNICAL DATA

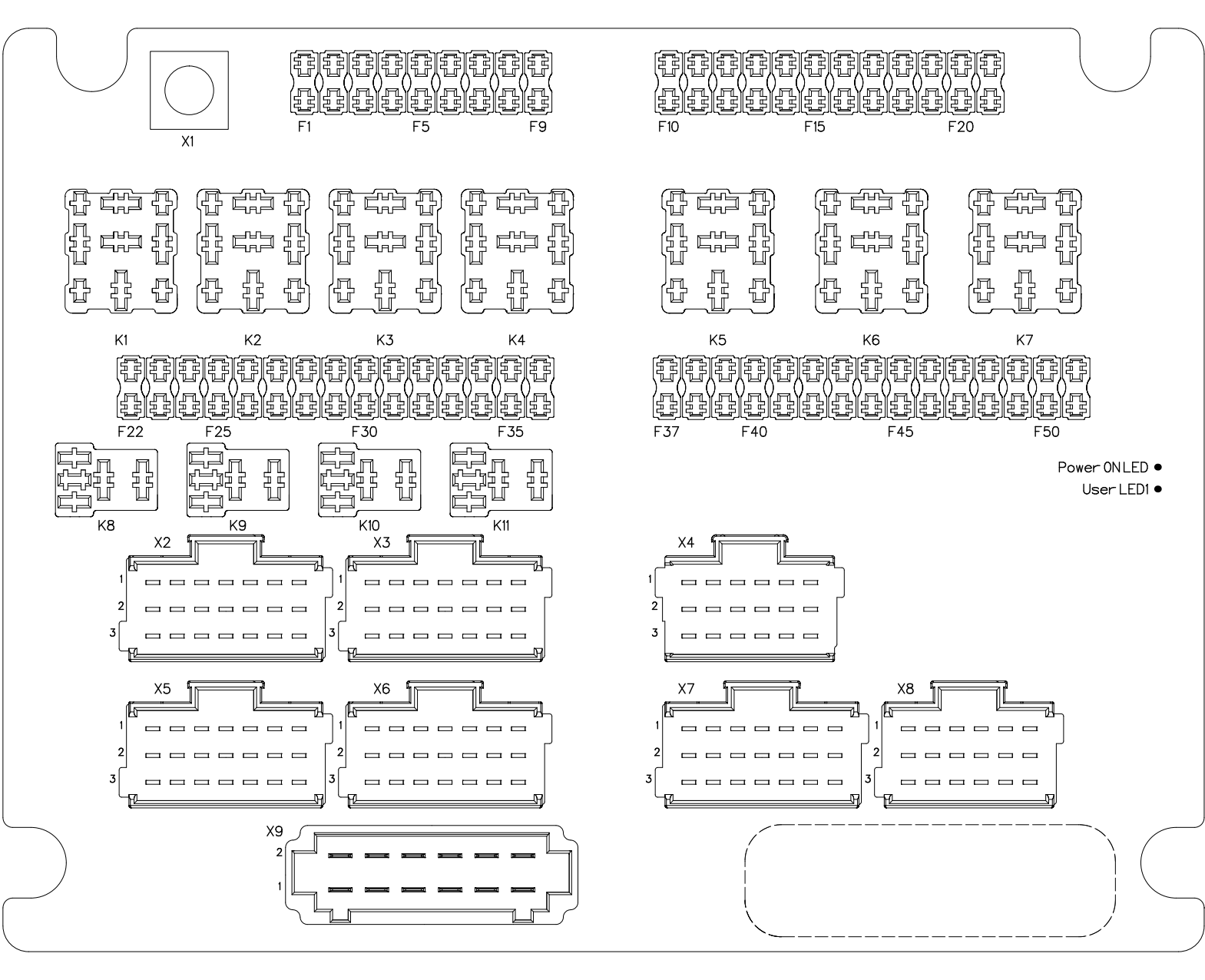
Power Supply

Component	Description	Range	
		Minimum Value	Maximum Value
Connector X1	DC voltage supply for +UE ECU supply and +UB1..4 power supply	8 V DC	32 V DC
Current consumption	1 x power pin fully loaded, short-term		200 A
- Stand-by	Sum of input currents at +UE and +UB1..4 ($U_{KL15} = 0$ V, ignition off)		< 2 mA
- ECU active	+UE supply current ($U_{KL15} > U_{KL15HIGH}$, no external load)		< 800 mA @ +UE = 12 V (TBD) < 400 mA @ +UE = 24 V (TBD)

TECHNICAL DRAWING



PIN ASSIGNMENT



PIN ASSIGNMENT

Connector X1: Power Bolt

X1	Additional description of functionality	Connected fuse	Connected relay
1	power bolt for power supply	F1 - F26, F30, F35, F38, F39, F40, F45, F47, F48, F49, F50, F51	K1 - K4

Pin assignment of connector X2 (green) sorted by pin numbers:

X2	Connected component	Additional description of functionality	Connected fuse	Connected relay
1	Fuse05_Out01_03	Supplied from X1	F25	
2	Fuse10_Out01_02	Supplied from X1	F10	
3	Fuse10_Out01_01	Supplied from X1	F8	
4	Fuse15_Out01_06	Supplied from X1	F1	
5	IDA35V_7	Input of controller		
6	OP2A_14	Output of controller		
7	Fuse05_Out01_02	Supplied from X1	F2	
8	IDA35V_8	Input of controller		
9	IDA35V_9	Input of controller		
10	Fuse05_Out01_01	Supplied from X1	F4	
11	IDA35V_4	Input of controller		
12	IDA35V_5	Input of controller		
13	Rel30_normOpen02_01	Supplied from X1	F27	K2
14	IDA35V_6	Input of controller		
15	IDA35V_3	Input of controller		

Pin assignment of connector X2 (green) sorted by pin numbers:

X2	Connected component	Additional description of functionality	Connected fuse	Connected relay
16	Rel30_normOpen02_01	Supplied from X1	F28	K2
17	CAN4_H or RS485_A	CAN bus or serial interface of controller		
18	CAN4_H or RS485_A	CAN bus or serial interface of controller		
19	OP2A_16	Output of controller		
20	CAN4_L or RS485_B	CAN bus or serial interface of controller		
21	CAN4_L or RS485_B	CAN bus or serial interface of controller		

Pin assignment of connector X3 (magenta) sorted by pin numbers:

X3	Connected component	Additional description of functionality	Connected fuse	Connected relay
1	Rel25_Can9Pol01_02			K5 KL87a
2	Rel25_Can9Pol01_02			K5 C
3	OD2A_1	Output of controller		
4	Rel30_normOpen02_02	Supplied from X1	F32	K3
5	IACV_2	Input of controller		
6	OD2A_2	Output of controller		
7	Rel30_normOpen02_03	Supplied from X1	F33	K4
8	IDA35V_12	Input of controller		
9	IACV_3	Input of controller		
10	Fuse10_Out01_07	Supplied from X1	F7	

PIN ASSIGNMENT

Pin assignment of connector X3 (magenta) sorted by pin numbers:

X3	Connected component	Additional description of functionality	Connected fuse	Connected relay
11	IDA35V_10	Input of controller		
12	IACV_1	Input of controller		
13	Rel25_Can9Pol01_02			K5 KL86
14	IDA5V_3	Input of controller		
15	IDA35V_11	Input of controller		
16	Rel15_normOpen01_02	Supplied from X1	F35	K11
17	5Vext	5Vext external sensor supply output of controller		
18	OD2A_3	Output of controller		
19	Rel25_Can9Pol01_02	Supplied from X1		K5
20	Fuse02_Out02_01	AGND of 5Vext of the ESX-3CM	F42	
21	OD2A_4	Output of controller		

Pin assignment of connector X4 (white) sorted by pin numbers:

X4	Connected component	Additional description of functionality	Connected fuse	Connected relay
1	Fuse15_Out01_07	Supplied from X1	F11	
2	OP2A_2	Output of controller		
3	In35_HighLow01_01	Input of controller, Input_5		
4	Fuse15_Out01_03	Supplied from X1	F39	
5	CAN2_L	CAN bus of controller		
6	CAN2_L	CAN bus of controller		

Pin assignment of connector X4 (white) sorted by pin numbers:

X4	Connected component	Additional description of functionality	Connected fuse	Connected relay
7	Fuse15_InOut01_03	External voltage supply in	F41	
8	CAN2_H	CAN bus of controller		
9	CAN2_H	CAN bus of controller		
10	Fuse15_InOut01_03	External voltage supply out	F41	
11	GND			
12	OP2A_8	Output of controller		
13	Rel15_Can9Pol01_01			K6 C
14	Rel15_Can9Pol01_01			K6 KL30
15	OP2A_1	Output of controller		
16	Bts08_HalfBridge01_02	Supplied from X1	F47	Internal (K13)
17	Bts08_HalfBridge01_01	Supplied from X1	F45	Internal (K12)
18	IDA35V_2	Input of controller		

Pin assignment of connector X5 (blue) sorted by pin numbers:

X5	Connected component	Additional description of functionality	Connected fuse	Connected relay
1	Fuse15_InOut01_01	External voltage supply in	F29	
2	Fuse15_Out01_05	Supplied from X1	F9	
3	In35_Highside01_01	Input of controller, Input_1		
4	Fuse15_InOut01_01	External voltage supply out	F29	
5	GND			

PIN ASSIGNMENT

Pin assignment of connector X5 (blue) sorted by pin numbers:

X5	Connected component	Additional description of functionality	Connected fuse	Connected relay
6	OP2A_5	Output of controller		
7	RS232_TxD	Serial interface		
8	RS232_RxD	Serial interface		
9	OP2A_6	Output of controller		
10	Fuse15_InOut01_02	External voltage supply out	F36	
11	CAN1_H	CAN bus		
12	CAN1_H	CAN bus		
13	Rel30_normOpen02_03	Supplied from X1	F34	K4
14	CAN1_L	CAN bus		
15	CAN1_L	CAN bus		
16	Rel30_normOpen02_02	Supplied from X1	F31	K3
17	IDA5V_6	Input of controller		
18	OP2A_7	Output of controller		
19	Rel15_normOpen01_01	Supplied from X1	F30	K10
20	IDA35V_1	Input of controller		
21	In35_HighLow01_02	Input of controller, Input_6		

Pin assignment of connector X6 (yellow) sorted by pin numbers:

X6	Connected component	Additional description of functionality	Connected fuse	Connected relay
1	In35_Door01_01	Input of controller, Input_4		
2	In35_Highside01_02	Input of controller, Input_2		

Pin assignment of connector X6 (yellow) sorted by pin numbers:

X6	Connected component	Additional description of functionality	Connected fuse	Connected relay
3	In35_Highside01_03	Input of controller, Input_3		
4	In35_HighLow01_04	Input of controller, Input_8		
5	OP2A_15	Output of controller		
6	In35_HighLow01_03	Input of controller, Input_7		
7	Rel15_Can9Pol01_01			K6 KL87
8	Rel15_Can9Pol01_01			K6 KL87a
9	OP2A_13	Output of controller		
10	Rel15_Can9Pol01_01	Supplied from X1		K6
11	Rel25_Can9Pol01_01			K7 C
12	IDA5V_4	Input of controller		
13	OP2A_9	Output of controller		
14	Rel25_Can9Pol01_01	Supplied from X1		K7
15	OP2A_11	Output of controller		
16	Rel15_Can9Pol01_01			K6 KL86
17	Rel25_Can9Pol01_01			K7 KL87a
18	OP2A_12	Output of controller		
19	Rel25_Can9Pol01_01			K7 KL86
20	Fuse15_InOut01_02	External voltage supply in	F36	
21	OP2A_10	Output of controller		

PIN ASSIGNMENT

Pin assignment of connector X7 (brown) sorted by pin numbers:

X7	Connected component	Additional description of functionality	Connected fuse
1	Fuse15_InOut01_04	External voltage supply out	F37
2	Fuse15_InOut01_04	External voltage supply in	F37
3	OD2A_7	Output of controller	
4	Fuse15_Out01_01	Supplied from X1	F38
5	IACV_4	Input of controller	
6	GND		
7	Fuse15_Out01_04	Supplied from X1	F40
8	OD2A_8	Output of controller	
9	OD2A_6	Output of controller	
10	Fuse15_InOut01_05	External voltage supply in	F43
11	IDA5V_1	Input of controller	
12	IDA5V_2	Input of controller	
13	Fuse15_InOut01_05	External voltage supply out	F43
14	IACV_7	Input of controller	
15	IACV_8	Input of controller	
16	Fuse10_Out01_03	Supplied from X1	F16
17	IACV_6	Input of controller	
18	OP4A_2	Output of controller	
19	OP4A_1	Output of controller	

Pin assignment of connector X7 (brown) sorted by pin numbers:

X7	Connected component	Additional description of functionality	Connected fuse
20	OD2A_5	Output of controller	
21	IACV_5	Input of controller	

Pin assignment of connector X8 (grey) sorted by pin numbers:

X8	Connected component	Additional description of functionality	Connected fuse	Connected relay
1	Bts10_Highside01_01	Supplied from X1	F49	Internal (K14)
2	Fuse10_Out01_08	Supplied from X1	F17	
3	OP2A_3	Output of controller		
4	Fuse15_Out01_02	Supplied from X1	F18	
5	IDA5V_5	Input of controller		
6	Fuse02_Out02_02	AGND of 5-12Vext of the controller	F46	
7	Fuse10_Out01_04	Supplied from X1	F20	
8	Fuse10_Out01_05	Supplied from X1	F48	
9	5-12Vext	5-12 Vext external sensor supply output of controller		
10	Fuse10_Out01_06	Supplied from X1	F21	
11	IDA5V_8	Input of controller		
12	OP4A_3	Output of controller		
13	Bts05_Highside01_01	External voltage supply in	F44	Internal (K15)
14	IDA5V_7	Input of controller		
15	OP4A_4	Output of controller		

PIN ASSIGNMENT

Pin assignment of connector X8 (grey) sorted by pin numbers:

X8	Connected component	Additional description of functionality	Connected fuse	Connected relay
16	Bts05_Highside01_02	Supplied from X1	F50	Internal (K16)
17	Bts05_Highside01_01	External voltage supply out	F44	Internal (K15)
18	OP2A_4	Output of controller		

Pin assignment of connector X9 (black) sorted by pin numbers:

X9	Connected component	Additional description of functionality	Connected fuse	Connected relay
1	Rel25_normOpen01_01	Supplied from X1	F22	K8
2	Rel40_normOpen02_01	Supplied from X1	F24	K1
3	Rel40_normOpen02_01	Supplied from X1	F23	K1
4	Rel25_normOpen01_02	Supplied from X1	F26	K9
5	Fuse25_Out01_01	Supplied from X1	F5	
6	Fuse25_Out01_02	Supplied from X1	F3	
7	Fuse25_Out01_04	Supplied from X1	F12	
8	Fuse25_Out01_03	Supplied from X1	F6	
9	Rel25_Can9Pol01_02			K5 KL30
10	Rel25_Can9Pol01_02			K5 KL87
11	Rel25_Can9Pol01_01			K7 KL30
12	Rel25_Can9Pol01_01			K7 KL87

QUALIFICATION

Compliance Information

Norm	Description
EMC industrial (CE)	This chapter is not fully available at this state of the BCX-3CLU development.
EMC automotive	This chapter is not fully available at this state of the BCX-3CLU development.
Electrical tests	This chapter is not fully available at this state of the BCX-3CLU development.
Climatic and mechanical tests	This chapter is not fully available at this state of the BCX-3CLU development.