

## TECHNICAL DATA

### DESCRIPTION

The versatile M3600 is both controller and gateway. With the up to 39 inputs and outputs, you have many options to control various components.

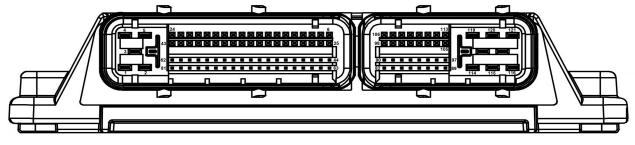
# REGULATORY APPROVALS AND TESTING

Housing	Aluminum casing with cooling fins	E1 Label	ECE-R10 Rev. 5				
Connector	Tyco AMPMODU WP 121 pins	E1 type approval	06 8037				
Housing dimensions	95.1 x 179 x 39.3 mm (housing) 110.4 x 179 x 39.3 mm (incl. plug)	Electrical tests	According to ISO 16750-2 or -4: Reverse polarity				
Weight	480 g		Disconnection pin/connector Superimposed alternating voltage				
Temperature range acc. to ISO 16750-4	-40 °C+85 °C		Slow decrease and increase of supply voltage				
Environmental protecti- on acc. to ISO 20653	IP68 when using the covers in the connector kit and the cable harness sheath acc. to the accessories list CAUTION! Follow the mechanical instructions!		Momentary drop in supply voltage Reset behaviour at voltage drop Load test at $T_{max}$ at +85 °C Long term overvoltage at $T_{max}$ -20 °C Operation/storage test at $T_{min}$				
Current consumption	67 mA		Operation/storage test at T <sub>max</sub>				
Over-current protection	40 A (see page 3)		According to ISO 7637-2:				
Total inputs and outputs	38 (18 inputs; 10 I/O's; 10 outputs,		Pulse 1, 2a, 2b, 3a, 3b, 4				
	4 are PWM capable with integrated current measurement INA)	SOFTWARE/PRC	OGRAMMING				
Inputs	<b>Configurable as:</b> Digital, positive encoder signals Analog (011.4 / 33.68 V)						
		Programming System					
	Digital, negative encoder signals Frequency inputs	MRS APPLICS STUDIO The Applics Studio is the new development and tool platform for					
Outputs	<b>Configurable as:</b> Digital, positive switching (High- Side)	our assemblies. Program your MRS controls quickly ar with our stand-alone software. The focus is on your app					
	Depends on the equipment: PWM output up to 500 Hz Constant voltage source 5 V Const. current source max. 200mA	For extended storage capacity from 32k you need Codewarrior license. Download the paid license easily a securely from NXP.					
Supply voltage	932 V 12 V (Code B) and 24 V (Code E), acc. to ISO 16750-2						
Starting voltage	8 V						
Overvoltage protection	≥ 33 V						
Undervoltage cut-off	8 V						
Quiescent current	3.35 mA (24 V); 0.3 mA (12 V)						
Reverse polarity protect.	yes						
CAN Interfaces	CAN Interface 2.0 A/B, ISO 11898 compliant						
Baudrate	Up to max. 1000 kbps default: 125 kbps						



### **INPUT FEATURES - SUMMARY**

Pin 6, 7, 102, 106	Analog inputs 0…33 V Resolution	12 Bit	Pin 21, 23, 24	Analog inputs 0…33 V Resolution	12 Bit
Voltage input 033 V (see <u>A</u> )	Input resistance Input frequency Accuracy	22.3 ± 0.3 kΩ f <sup>*</sup> = 6 Hz ± 5 %	Voltage input $033 \text{ V} (\text{see } \underline{E})$	Input resistance Input frequency Accuracy	22.3 ± 0.3 kΩ f <sup>*</sup> <sub>g</sub> = 6 Hz ± 5 %
Pin 8	Analog inputs or frequency inputs Resolution	12 Bit	Digital input Positive (see $\underline{E}$ )	Input resistance Input frequency Turn-on threshold Turn-off threshold	22.3 ± 0.3 kΩ f <sub>g</sub> *= 6 Hz Pin 21 = 19.4 V Pin 23 = 21 V
Voltage input 011.3 V (see <u>B</u> )	Input resistance Input frequency Accuracy	22 ± 1 kΩ f <sub>g</sub> *= 6 Hz ± 3 %			Pin 24 = 13.5 V Pin 21 = 19.2 V Pin 23 = 21 V
Frequency input	Input resistance	22 ± 1 kΩ			Pin 24 = 13.5 V
(via use of the digital input, programming via usercode.c see <u>B</u> )	Accuracy	to 3.2 kHz ± 3 % (measu- red with square wave signal with	Pin 56, 58, 60, 62, 75, 77, 79, 81	lOs (analog- or digital input) Resolution	12 Bit
uccioucio coo <u>e</u> ,	Factor	10VPeak) Frequency = 4 x digits	Voltage input 011.3 V (see <u>F</u> )	Input resistance Input frequency Accuracy	15 kΩ f <sub>g</sub> *= 6 Hz ± 5 %
Pin 9	Analog inputs 011.3 V Resolution	12 Bit	Digital input Positive (see <u>F</u> )	Input resistance Input frequency Turn-on threshold Turn-off threshold	16.5 kΩ f *= 6 Hz 7 V 7 V
Voltage input 011.3 V (see <u>C</u> )	Input resistance Input frequency Accuracy	22 ± 1 kΩ f <sub>g</sub> *= 6 Hz ± 3 %	Pin 116, 121	IOs (Analog inputs 0…11.3 V) Resolution	12 Bit
Pin 13, 14, 32, 33	PT200/PT1000 Sen- sor Input Resolution	12 Bit	Digital input 011.3 V(see <u>F</u> )	Input resistance Input frequency Accuracy	22 ± 1 kΩ fg*= 6 Hz ± 3 %
Pull-up Input	Pull-up resistance	1 kΩ		· · · · · · · · · · · · · · · · · · ·	
(see <u>D</u> )	Input frequency	f <sub>g</sub> *= 6 Hz	Pin 108	Input for inductive ro-	
Pin 19, 38, 40, 42, 43	Analog- or digital inpu Resolution	it 12 Bit		tary encoder sensors Resolution	12 Bit
Voltage input 011.3 V (see $\underline{E}$ )	Input resistance Input frequency Accuracy	22.3 ± 0,3 kΩ $f_g^*$ = 6 Hz ± 3 % max.	Voltage input 05 V (see <u>B</u> ) Max. Amplitude 6.5 V	Accuracy	± 3 % up to 200 Hz
Digital input Positive (see <u>E</u> )	Input resistance Input frequency Turn-on threshold Turn-off threshold	22,6 ± 0,2 kΩ f *= 6 Hz 7 V 7 V	*f <sub>g</sub> = cutoff frequency input	(-3 dB amplitude) when	using the analog





### **OUTPUT FEATURES - SUMMARY**

Pin 48, 50, 52, 54, 56, 58, 60, 62, 75,	Protective circuit for inductive loads	Optionally integrated	Pin 44, 111	Wire fault diagnostics	Possible via current sense	
<b>77, 79, 81</b> (VNQ5050)	Wire fault diagnostics	Possible via current sense		Short circuit diagnostics	Possible via current sense	
	Short circuit diagno- stics	Possible via current sense		Short circuit resistance against GND and $V_s$	Yes, according ISO 16750-	
Digital, positive switching (high side; see <u>F</u> and <u>G</u> )	Switching voltage932 V DCSwitching current0.022.5 A**Conversion factor1 Digitcurrent sense0.9 ± 0.1 mA		0.022.5 A** Digital Output 1 Digit (see I)		2:2012 r external Panel	
Short circuit resistance against	Switching-off is controll driver for each output c		<b>Pin 114</b> (BTS650)	Wire fault diagnostics	Possible via current sense	
GND and VS				Short circuit diagnostics	Possible via current sense	
<b>Pin 67, 69, 71, 73</b> (VNQ5050 with PWM and INA	with inductive loads integrated			Short circuit resistance against GND and $V_s$	Yes	
current sense)	Wire fault diagnostics	Possible via current sense	Digital, positive switching (High-Si-	Switching voltage Switching current	932 V DC 0.0210 A**	
	Short circuit diagnostics	Possible via current sense	de; see <u>H</u> )	Conversion factor current sense	1 Digit 0.9 ± 0.1 mA	
Digital, positive	Switching voltage	932 V DC				
switching (high side; see <u>H</u> )	Switching current Conversion factor		<b>Pin 116, 121</b> (BTS6143)	Wire fault diagnostics	Possible via current sense	
PWM-Output	current sense Output frequency	0.9 ± 0.1 mA 500 Hz		Short circuit diagnostics	Possible via current sense	
(see <u>H</u> )	Duty cycle Resolution	0100 % 1 ‰		Short circuit resistance against GND and $\mathrm{V}_{\mathrm{s}}$	Yes	
	Switching current	Up to 2.5A** (see page 5)	Digital, positive switching (high	Switching voltage Switching current	9-32 V DC 0.02-10 A**	
Short circuit resistance against GND and VS	Switching-off is controll driver for each output c		side; see <u>F</u> )	Conversion factor current sense	1 Digit 1.2 ± 0.1 mA	

# \*\*ATTENTION: The maximum current load capacity of the total module amounts 40 A, if the terminals 30\_1 (pin 119) and 30\_2 (pin 120) are connected.

### PIN ASSIGNMENT POWER SUPPLY AND INTERFACES

Pin	Description	Pin	Description			
15	CAN2-H	105	Battery/ignition contact KL 15 GSM,			
16, 17, 18	RS 485 B		optional as DI			
20	CAN1-L	113	Battery/ignition contact KL 15, optional as DI			
22	CAN0-H	119	KL 30_1: supply voltage for outputs and			
27	5V sensor output		supply voltage for CPU			
34	CAN2-L	120	KL 30_2: supply voltage for outputs and			
35, 36, 37	RS 485 A		supply voltage for CPU			
39	CAN1-H	1, 3, 4, 10, 11, 12, 28, 29, 30, 31,	Ground			
41	CAN0-L	45, 46, 47, 49, 51, 53, 55, 57, 59, 61, 63, 64, 65, 66, 68, 70, 72, 74,				
98	5V sensor output	76, 78, 80, 82, 83, 84, 85, 86, 89,				
		90, 91, 92, 93, 94, 97, 99, 100, 101, 103, 115, 117, 118				



# PIN ASSIGNMENT INPUTS AND OUTPUTS

Alternative functions like frequency/current or pull-up inputs are depending on assembly options (see table on page 5).

Pin	Signal	Description	Pin	Signal	Description
6	AIM_30V_X6	Analog input 033 V	62	AIM_IO1	Analog input IO1 011.4 V or
7	AIM_30V_X7	Analog input 033V		DIM_IO1 DOM IO1	digital input or digital output with
8	AIM_RPM DI_RPM 0	Frequency input Digital input 011.3 V	67	AIM_CUR_IO1	current sense Digital output DO8 with
9	AIM_INPUT1	Analog input 011.3 V	07	PWM_08	PWM capability and
13	AIM_PT200_1P	Pull-up input PT200/PT1000		AI_SENS_PWM_08	INA current sense
14	AIM_PT200_2P	Pull-up input PT200/PT1000	69	DO_PWM_07 PWM_07	Digital output DO7 with PWM capability and
19	AIM_I4 DIM_I4	Analog input 011.3 V or digital input 011.3 V	74	AI_SENS_PWM_07	INA current sense
21	AIM_I3 DIM_I3	Analog input 033 V or digital input	71	DO_PWM_O6 PWM_O6 AI_SENS_PWM_O6	Digital output DO6 with PWM capability and INA current sense
23	AIM_I2 DIM_I2	Analog input 033 V or digital input	73	 DO_PWM_05 PWM_05	Digital output DO5 with PWM capability and
24	AIM_I1	Analog input 033 V or		AI_SENS_PWM_05	INA current sense
32	DIM_I1 AIM PT200 4P	digital input Pull-up input PT200/PT1000	75	AIM_IO8 DIM_IO8	Analog input IO8 011.4 V or digital input or
33	AIM_PT200_3P	Pull-up input PT200/PT1000			digital output with
38	AIM_I8 DIM I8	Analog input 011.3 V or digital input 011.3 V	77	AIM_CUR_IO8 AIM_IO7 DIM_IO7	current sense Analog input IO7 011.4 V or
40	_ AIM_17 DIM_17	Analog input 011.3 V or digital input 011.3 V		DIM_IO7 DOM_IO7 AIM_CUR_IO7	digital input or digital output with current sense
42	AIM_I6 DIM_I6	Analog input 011.3 V or digital input 011.3 V	79	AIM_IO6 DIM_IO6	Analog input IO6 011.4 V or digital input or
43	AIM_I5 DIM_I5	Analog input 011.3 V or digital input 011.3 V		DOM_IO6 AIM_CUR_IO6	digital output with current sense
48	DOM_01 AIM_CUR_01	Digital output O1 with current sense	81	AIM_IO5 DIM_IO5 DOM IO5	Analog input IO5 011.4 V or digital input or digital output with
50	DOM_02	Digital output O2 with		AIM_CUR_IO5	current sense
52	AIM_CUR_O2 DOM 03	current sense Digital output O3 with	102	AIM_30V_X102	Analog input 033 V
52	AIM_CUR_03	current sense	106	AIM_30V_X106	Analog input 033 V
54	DOM_04 AIM_CUR_04	Digital output O4 with current sense	108	DI_RPM_2	Input for inductive rotary encoders
56	AIM_IO3 DIM_IO3	Analog input IO3 011.4 V or digital input or	111	DOM_PANEL_ON	Digital output VB Panel with max. 200 mA
	DOM_IO3 AIM_CUR_IO3	digital output with current sense	114	AI_VCC_PANEL DO_NOX	Analog input 013.7 V Digital output NOX with
58	AIM_IO4	Analog input IO4 011.4 V		AI_NOX	current sense
	DIM_IO4 DOM_IO4 AIM_CUR_IO4	or digital input or digital output with current sense	116	AI_OUT_CB_1 DOM_OUT_CB_1 AI_CUR_CB_1	Analog input 011.3 V or digital output CB1 with current sense
60	AIM_IO2 DIM_IO2 DOM_IO2 AIM_CUR_IO2	Analog input IO2 011.4 V or digital input or digital output with current sense	121	AI_OUT_CB_2 DOM_OUT_CB_2 AI_CUR_CB_2	Analog input 011.3 V or digital output CB1 with current sense



### PIN - FEATURE MAP

Pin         Analog input         Digital input Digital output 56         DiM_103         DOM_103           58         AIM_102         DIM_102         DOM_104         DOM_104           60         AIM_102         DIM_102         DOM_104         DOM_012           62         AIM_106         DIM_102         DOM_106         So DOM_02         DOM_016           77         AIM_107         DIM_106         DOM_016         So DOM_026         So DOM_026           79         AIM_017         DIM_106         DOM_0105         So DOM_026         So DOM_026           81         AIM_017         DIM_106         DOM_017 C6_2         DOM_017 C6_2         So DOM_027           71         AIM_017         DIM_106         DOM_017 C6_2         DOM_017 C6_2         To Do_PWM_07           7         AIM_027         Do 33 V         DOM_017 C6_2         To Do_PWM_06         PWM_07           7         AIM_027         DO 33 V         DO_0113 V         SoS12XE0384         DO_0284 KB         To CAN bus 2 high           13         AIM_PT200_1P         PT200/PT1000 PU         SOS12XE0384         SoS12XE0384         CAN1_L         CAN bus 2 high           14         AIM_120         DIM_110         O 33 V         So S12 XE0384							Ī	I/O								
S8         AIM_IO4         DIM_IO2         DOM_IO2           60         AIM_IO2         DIM_IO2         DOM_IO2           62         AIM_IO8         DIM_IO8         DOM_IO1           75         AIM_IO6         DIM_IO8         DOM_IO8           77         AIM_IO6         DIM_IO5         DOM_IO1           116         AI_MIO7         DIM_IO5         DOM_IO1           116         AI_OUT_CB_1         DOM_OUT_CB_1         DOM_OUT_CB_1           112         AI_OUT_CB_2         DOM_OUT_CB_1         DO_PWM_O8           64         AIM_30V_X6         0.33 V         DOM_OUT_CB_2         DO_PWM_O5           7         AIM_IO2         DOM_OUT_CB_2         DO_PWM_O5         PWM_O5           7         AIM_30V_X6         0.33 V         Interfaces and DC/DC         Interfaces and DC/DC           9         AIM_INPUT1         0.11.3 V         SS12XEO384         Interfaces and DC/DC         Pin           13         AIM_7200_1P         PT200/PT1000 PU         SS12XEO384         Interfaces and DC/DC         Pin           14         AIM_12         DIM_14         0.13.3 V         Post 2XEO384         Interfaces and DC/DC         Pin           13         AIM_7200_2P         PT200/P				Pin	Analog ir	put	Digital i	input	Digital output							
60         AIM_IO2         DIM_IO2         DOM_IO2           62         AIM_IO1         DIM_IO1         DOM_IO1           75         AIM_IO6         DIM_IO6         DOM_IO7           77         AIM_IO6         DIM_IO6         DOM_IO6           81         AIM_IO5         DIM_IO6         DOM_IO5           116         AI_OUT_CB,1         DOM_OUT_CB,2           121         AI_OUT_CB,2         DOM_OUT_CB,2           7         AIM_30V_X6         0-33 V           7         AIM_30V_X6         0-33 V           7         AIM_30V_X7         0-33 V           8         AIM_RPM         DI_RPM           013         AIM_PT200_1P         PT200/PT1000 PU           9         AIM_IP PT200_PP         PT200/PT1000 PU           13         AIM_PT200_2P         PT200/PT1000 PU           14         AIM_PT200_4P         PT200/PT1000 PU           23         AIM_12         DIM_12         0-33 V           24         AIM_12         DIM_12         0-33 V           23         AIM_PT200_3P         PT200/PT1000 PU           33         AIM_PT200_3P         PT200/PT1000 PU           34         AIM_PT200_3P         PT200/PT100				56	AIM_IO3		DIM_IO	3	DOM_IO3							
Image: second				58	AIM_IO4		DIM_IO	4	DOM_IO4							
Dim         Dim <td></td> <td></td> <td></td> <td>60</td> <td>AIM_IO2</td> <td></td> <td>DIM_IO</td> <td>2</td> <td>DOM_IO2</td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td>				60	AIM_IO2		DIM_IO	2	DOM_IO2							
Pin         Anim_1OS         DIM_1OS         DOM_1OS         DOM_1OS           79         AIM_1OS         DIM_1OS         DOM_1OS         DOM_0OT           79         AIM_1OS         DIM_1OS         DOM_1OS         DOM_0OT           81         AIM_1OS         DIM_1OS         DOM_1OS         DOM_0OT         S0           16         AI_OUT_CB_1         DOM_0UT_CB_1         DOM_0OT_CB_1         DOM_0OT_CB_1         DOM_0OT_CB_1           Analog/Digital inputs         Description         AIM_3OV_X6         0.33 V         DOM_0OT_CB_2         DOM_0OT_CB_1           AIM_3OV_X7         0.33 V         BAIM_INPUT1         0.11.3 V         DOM_0OT_CB_1         DIM_1OS DWM_0S         PWM_0S           9         AIM_INPUT1         0.11.3 V         S9S12XEQ384         Clock frequency: 8 MHz         Flash memory: 384 KB         R5485-B         R5485-B           13         AIM_12         DIM_10         0.33 V         Z         CANU_L         CAN bus 2 low           24         AIM_12         DIM_10         0.33 V         Z         Z         CANU_L         CAN bus 2 low           33         AIM_1P7200_2P         PT200/PT1000 PU         PT200/PT1000 PU         PR         S5, 37, 18 A85-A         R5485-A				62	AIM_IO1		DIM_IO	1	DOM_IO1					PWM out	put	
72       AIM_DOC       DIM_DOC       DOM_DOC       BIM_DOC       DOM_DOC         81       AIM_DOC       DIM_DOC       DOM_DOC       BI       DOM_DOC       BI         81       AIM_DOC       DIM_DOC       DOM_OUT_CB_1       DOM_OUT_CB_1       DOM_OUT_CB_1       DO_PWM_08       PWM_08         91       Analog/Digital inputs       Description       AIM_3OV_X6       0-33 V       DO_PWM_05       PWM_05       PWM_05         9       AIM_3OV_X6       0-33 V       BAIM_RPM       DI_RPM       O-11.3 V       DO_PWM_05       PWM_05       PWM_05         9       AIM_IPT200_2P       PT200/PT1000 PU       PT200/PT1000 PU       SOS12XEQ384       CAN bus 2 high       Ib6, 7, 18 R5 485-B       R5435-A         19       AIM_12       DIM_14       O-11.3 V       SOS12XEQ384       CAN bus 10w       22       CAN bus 10w       22       CAN bus 10w       22       CAN bus 0 high       Ib6, 7, 18 R5 485-B       R5435-A       B       S435-A       R5435-A       B       GA345-A       S9       CAN1, H       CAN bus 21ow       22       CAN0 H       CAN bus 0 high       Ib1					AIM_IO8		DIM_IO	8	DOM_IO8							
Pin       Alim_1Co       Dim_1Co       Dom_00t       Status         116       AI_OUT_CB_1       DOM_0UT_CB_1       DOM_0UT_CB_1       F       DO_PWM_08       PWM_08         121       AI_0UT_CB_2       DOM_0UT_CB_2       DOM_0UT_CB_1       DO_PWM_08       PWM_08         Pin       Analog/Digital inputs       Description       F       F       DO_PWM_08       PWM_08         6       AIM_30V_X6       0-33 V       0-33 V       F       DO_PWM_08       PWM_08         7       AIM_30V_X7       0-33 V       0-33 V       F       F       DO_PWM_08       PWM_08         8       AIM_INPUT1       0-11.3 V       0-33 V       S       SS12XEQ384       Ibit_17.18 K845-B       E       E       CAN1_L       CAN bus 2 high         14       AIM_14       DIM_12       0-33 V       S84 KB       E       E       E       20       CAN1_L       CAN bus 1 low         23       AIM_12       DIM_12       0-33 V       S3 K       E       E       S9       CAN1_L       CAN bus 1 low       22       CAN_L       CAN bus 2 low       35, 36, 37 IS 485-A       B       35       36, 37 IS 5485-A       39       CAN1_H       CAN bus 0 low       39       CAN1_H					AIM_IO7		DIM_IO	7	DOM_IO7							
Bit         Allw_IOJ         DiM_IOJ         DiMIJOJ         DiMIJOJ <thdimjoj< th=""> <thdimijoj< th=""> <thdimjo< td=""><td></td><td></td><td></td><td>79</td><td>AIM_IO6</td><td></td><td>DIM_IO</td><td>6</td><td>DOM_IO6</td><td></td><td></td><td></td><td>_</td><td></td><td></td><td></td></thdimjo<></thdimijoj<></thdimjoj<>				79	AIM_IO6		DIM_IO	6	DOM_IO6				_			
Ind         Ind <thind< th=""> <thind< th=""> <thind< th=""></thind<></thind<></thind<>					AIM_IO5		DIM_IO	5	DOM_IO5			<u> </u>				
Image: Second																
Analog/Digital input         Description           Fin         Analog Input         Digital input         Description           6         AIM_30V_X6         0-33 V           7         AIM_30V_X7         0-33 V           8         AIM_RPM         DI_RPM         0-11.3 V           9         AIM_INPUT1         0-11.3 V           13         AIM_PT200_1P         PT200/PT1000 PU           14         AIM_I4         DIM_I4         0-11.3 V           19         AIM_I4         DIM_I4         0-11.3 V           21         AIM_I2         DIM_I4         0-11.3 V           23         AIM_I2         DIM_I2         0-33 V           24         AIM_I1         DIM_I2         0-33 V           23         AIM_PT200_4P         PT200/PT1000 PU           38         AIM_PT200_4P         PT200/PT1000 PU           38         AIM_PT200_4P         PT200/PT1000 PU           38         AIM_I5         DIM_I5         O-11.3 V           40         AIM_PT200_3P         PT200/PT1000 PU         35, 36, 37 RS 485-A         RS485-A           39         CAN1_H         CAN bus 2 low         35, 36, 37 RS 485-A         RS485-A           30				121	AI_OUT_	CB_2	L .		DOM_OUT_CB	_2						
Pin         Analog Input         Digital input         Description           6         AIM_30V_X6         0-33 V           7         AIM_30V_X7         0-33 V           8         AIM_RPM         DI_RPM           9         AIM_INPUTI         0-11.3 V           13         AIM_PT200_1P         PT200/PT1000 PU           9         AIM_14         DIM_14         0-11.3 V           19         AIM_12         DIM_14         0-11.3 V           23         AIM_12         DIM_12         0-33 V           24         AIM_12         DIM_12         0-33 V           24         AIM_17         DIM_18         0-11.3 V           33         AIM_17         DIM_18         0-11.3 V           34         AIM_17         DIM_16         0-11.3 V           42         AIM_18         DIM_16         0-11.3 V           43         AIM_17         DIM_16         0-11.3 V           44         AIM_17         DIM_16         0-11.3 V           42         AIM_16         DIM_16         0-11.3 V           43         AIM_175         DIM_16         0-11.3 V           44         JIM_105         DIM_16         0-13.3 V <td></td> <td>Analog/Digital</td> <td>inputs</td> <td></td> <td></td> <td></td> <td></td> <td></td> <td><b>↑</b></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td>		Analog/Digital	inputs						<b>↑</b>							
6       AIM_30V_X6       0·33 V         7       AIM_30V_X7       0·33 V         8       AIM_RPM       DI_RPM       0·11.3 V         9       AIM_INPUT1       0·11.3 V       Interfaces and DC/DC         9       AIM_PT200_1P       PT200/PT1000 PU       S9S12XEQ384         14       AIM_PT200_2P       PT200/PT1000 PU       S9S12XEQ384         19       AIM_12       DIM_14       0·11.3 V         21       AIM_12       DIM_13       0·33 V         23       AIM_PT200_2P       PT200/PT1000 PU         24       AIM_11       DIM_12       0·33 V         23       AIM_PT200_3P       PT200/PT1000 PU         38       AIM_12       DIM_16       0·11.3 V         34       AIM_17       DIM_18       0·11.3 V         40       AIM_17       DIM_16       0·11.3 V         42       AIM_16       DIM_16       0·11.3 V         42       AIM_16       DIM_16       0·11.3 V         42       AIM_16       DIM_18       0·11.3 V         42       AIM_30V_X102       0·33 V         105       AIM_30V_X102       0·33 V         106       AIM_30V_X106       0·33 V <td>Pin</td> <td></td> <td></td> <td>Description</td> <td>n</td> <td></td>	Pin			Description	n											
7       AIM_3OV_X7       0.33 V         8       AIM_RPM       DI_RPM       0.11.3 V         9       AIM_INPUT1       0.11.3 V         13       AIM_PT200_1P       PT200/PT1000 PU         14       AIM_PT200_2P       PT200/PT1000 PU         19       AIM_I3       DIM_I4       0.11.3 V         21       AIM_13       DIM_I3       0.33 V         23       AIM_12       DIM_12       0.33 V         24       AIM_11       DIM_11       0.33 V         23       AIM_PT200_4P       PT200/PT1000 PU         33       AIM_PT200_3P       PT200/PT1000 PU         34       AIM_12       DIM_11       0.33 V         24       AIM_11       DIM_11       0.33 V         23       AIM_PT200_4P       PT200/PT1000 PU         38       AIM_18       DIM_18       0.11.3 V         40       AIM_16       DIM_15       0.11.3 V         42       AIM_16       DIM_15       0.11.3 V         43       AIM_15       DIM_15       0.11.3 V         42       AIM_16       DIM_16       0.11.3 V         43       AIM_25       DIM_15       0.11.3 V         42				· · ·												
8       AIM_RPM       DI_RPM       0-11.3 V         9       AIM_INPUT1       0-11.3 V       Interfaces and DC/DC         13       AIM_PT200_1P       PT200/PT1000 PU       S9S12XEQ384       CAN bus 2 high         14       AIM_PT200_2P       PT200/PT1000 PU       S9S12XEQ384       Cock frequency: 8 MHz         19       AIM_14       DIM_14       0-11.3 V       S9S12XEQ384       Cock frequency: 8 MHz         21       AIM_13       DIM_12       0-33 V       S8X 42       S8X 42         23       AIM_12       DIM_11       0-33 V       S8X 42       S8X 42         24       AIM_11       DIM_11       0-33 V       S8X 42       S8X 5-A         24       AIM_PT200_4P       PT200/PT1000 PU       S6, 37       RS 485-A       RS485-A         33       AIM_PT200_3P       PT200/PT1000 PU       S6, 37       RS 485-A       RS485-A         39       CAN1_H       CAN bus 1 high       A1       CAN bus 1 high       A1         40       AIM_16       DIM_15       0-11.3 V       Power supply       S6, 37       RS 485-A       RS485-A         39       CAN1_H       CAN bus 1 high       A1       CAN bus 1 high       A1       CAN bus 1 high       A1						lΓ				7	-	114				]
J       AIM_IN_INIT       DIALS       DIALS       CAN bus 2 high         13       AIM_PT200_1P       PT200/PT1000 PU       P	8		DI RPM					E	CU				Interfaces	s and DC/D	<u>c</u>	
13       AlM_PT200_1P       PT200/PT1000 PU         14       AIM_PT200_2P       PT200/PT1000 PU         19       AIM_IA       DIM_IA       0-11.3 V         19       AIM_I3       DIM_I3       0-33 V         21       AIM_I2       DIM_I2       0-33 V         23       AIM_PT200_4P       PT200/PT1000 PU         24       AIM_PT200_4P       PT200/PT1000 PU         33       AIM_PT200_4P       PT200/PT1000 PU         34       AIM_PT200_3P       PT200/PT1000 PU         38       AIM_I8       DIM_I8       0-11.3 V         40       AIM_I7       DIM_I6       0-11.3 V         42       AIM_I6       DIM_I6       0-11.3 V         43       AIM_I5       DIM_I5       0-11.3 V         44       AIM_I6       DIM_I5       0-11.3 V         43       AIM_I6       DIM_I5       0-11.3 V         44       AIM_I6       DIM_I5       0-11.3 V         43       AIM_SOV_X102       0-33 V         106       AIM_30V_X102       0-33 V         106       AIM_30V_X102       0-33 V         105       DI_KL15_GSM Battery/ignition contact 15 according to DIN 72552/Digital input (optional)	9	AIM INPUT1		0-11.3 V								Pin	Signal	Out	put	Description
14       AIM_PT200_2P       PT200/PT1000 PU         19       AIM_I4       DIM_I4       0-11.3 V         21       AIM_I3       DIM_I3       0-33 V         23       AIM_I2       DIM_I2       0-33 V         24       AIM_PT200_4P       PT200/PT1000 PU         33       AIM_PT200_4P       PT200/PT1000 PU         33       AIM_PT200_3P       PT200/PT1000 PU         38       AIM_I8       DIM_I8       0-11.3 V         40       AIM_I7       DIM_I6       0-11.3 V         43       AIM_I5       DIM_I5       0-11.3 V         43       AIM_30V_X102       0-33 V         106       AIM_30V_X102       0-33 V         106       AIM_30V_X106       0-33 V         105       DI_KL15_GSM       Battery/ignition contact 15 according to DIN 72552/Digital input (optional)         113       D_KL15       Battery/ignition contact 15 according to DIN 72552/Digital input (optional)         113       D_KL15_GSM       Battery/ignition contact 15 according to DIN 72552/Digital input (optional)         113       D_KL15_GSM       Battery/ignition contact 15 according to DIN 72552/Digital input (optional)         120       AIM_KL30_2       Supply voltage/Analog input (optional)         120 <td>13</td> <td>-</td> <td></td> <td>PT200/PT10</td> <td>000 PU</td> <td></td> <td>00010</td> <td>VEO</td> <td>294</td> <td></td> <td></td> <td>15</td> <td>CAN2_H</td> <td></td> <td></td> <td>CAN bus 2 high</td>	13	-		PT200/PT10	000 PU		00010	VEO	294			15	CAN2_H			CAN bus 2 high
19       AIM_14       DIM_14       0-11.3 V         21       AIM_13       DIM_13       0-33 V         23       AIM_12       DIM_12       0-33 V         24       AIM_11       DIM_11       0-33 V         32       AIM_PT200_4P       PT200/PT1000 PU         33       AIM_PT200_3P       PT200/PT1000 PU         34       AIM_16       DIM_16       0-11.3 V         40       AIM_16       DIM_16       0-11.3 V         42       AIM_16       DIM_15       0-11.3 V         43       AIM_15       DIM_15       0-11.3 V         43       AIM_30V_X102       0-33 V         106       AIM_30V_X106       0-33 V         107       Input for inductive encoder       DI_KL15_GSM       Battery/ignition contact 15 according to DIN 72552/Digital input (optional)         113       DI_KL13_02       Supply voltage/Analog input (optional)       113         119       AIM_KL_30_1       Supply voltage/Analog input (optional)       120         120       AIM_KL_30_2       Supply voltage/Analog input (optional)       125         120       AIM_KL_30_2       Supply voltage/Analog input (optional)       125	14			PT200/PT10	000 PU	<b>N</b>						16, 17, 18	RS 485-B			RS485-B
21       AIM_13       DIM_13       0-33 V         23       AIM_12       DIM_12       0-33 V         24       AIM_11       DIM_11       0-33 V         32       AIM_PT200_4P       PT200/PT1000 PU         33       AIM_PT200_3P       PT200/PT1000 PU         38       AIM_18       DIM_18       0-11.3 V         40       AIM_17       DIM_16       0-11.3 V         42       AIM_16       DIM_15       0-11.3 V         43       AIM_30V_X102       0-33 V         102       AIM_30V_X102       0-33 V         106       AIM_30V_X106       0-33 V         119       AIM_KL30_1       Supply voltage/Analog input (optional)         112       Input for inductive encoder       119       AIM_KL_30_2       Supply voltage/Analog input (optional)         1120       AIM_KL_30_2       Supply voltage/Analog input (optional)       120	19		DIM 14	· ·						-	-		CAN1_L			
23       AIM_12       DIM_12       0-33 V         24       AIM_11       DIM_11       0-33 V         32       AIM_PT200_4P       PT200/PT1000 PU         33       AIM_PT200_3P       PT200/PT1000 PU         38       AIM_18       DIM_18       0-11.3 V         40       AIM_17       DIM_17       0-11.3 V         42       AIM_16       DIM_16       0-11.3 V         43       AIM_15       DIM_15       0-11.3 V         102       AIM_30V_X102       0-33 V         106       AIM_30V_X106       0-33 V         107       Input for inductive encoder       109         119       AIM_KL_30_1       Supply voltage/Analog input (optional)         120       AIM_KL_30_2       Supply voltage/Analog input (optional)		-	-				RAM: 2	4 KE	В́				CAN0_H			
24       AIM_11       DIM_11       0-33 V         24       AIM_PT200_4P       PT200/PT1000 PU         33       AIM_PT200_3P       PT200/PT1000 PU         38       AIM_18       DIM_18       0-11.3 V         40       AIM_17       DIM_17       0-11.3 V         42       AIM_16       DIM_16       0-11.3 V         43       AIM_15       DIM_15       0-11.3 V         43       AIM_30V_X102       0-33 V         102       AIM_30V_X106       0-33 V         106       AIM_30V_X106       0-33 V         105       DI_KL15_GSM Battery/ignition contact 15 according to DIN 72552/Digital input (optional)         113       DI_KL15       Battery/ignition contact 15 according to DIN 72552/Digital input (optional)         113       DI_KL15_GSM Battery/ignition contact 15 according to DIN 72552/Digital input (optional)         113       DI_KL15_GSM Battery/ignition contact 15 according to DIN 72552/Digital input (optional)         120       AIM_KL_30_1 Supply voltage/Analog input (optional)         120       AIM_KL_30_2 Supply voltage/Analog input (optional)         120       AIM_KL_30_2 Supply voltage/Analog input (optional)							EEPRC	DM: 4	4 KB					VRE	F	
32       AIM_PT200_4P       PT200/PT1000 PU         33       AIM_PT200_3P       PT200/PT1000 PU         38       AIM_I8       DIM_I8       0-11.3 V         40       AIM_I7       DIM_I7       0-11.3 V         42       AIM_I6       DIM_I6       0-11.3 V         43       AIM_I5       DIM_I5       0-11.3 V         102       AIM_30V_X102       0-33 V         106       AIM_30V_X106       0-33 V         107       Input for inductive encoder       19         119       AIM_KL_30_1 Supply voltage/Analog input (optional)         120       AIM_KL_30_2 Supply voltage/Analog input (optional)		-											-			
33       AIM_PT200_3P       PT200/PT1000 PU         38       AIM_I8       DIM_I8       0-11.3 V         40       AIM_I7       DIM_I7       0-11.3 V         42       AIM_I6       DIM_I6       0-11.3 V         43       AIM_I5       DIM_I5       0-11.3 V         102       AIM_30V_X102       0-33 V         106       AIM_30V_X106       0-33 V         Input for inductive encoder         IPin       Digital input       Description         120       AIM_L30_1       Supply voltage/Analog input (optional)         120       AIM_S0V_X106       0-33 V		_						1								
38       AIM_I8       DIM_I8       0-11.3 V         40       AIM_I7       DIM_I7       0-11.3 V         42       AIM_I6       DIM_I6       0-11.3 V         43       AIM_I5       DIM_I5       0-11.3 V         43       AIM_S0V_X102       0-33 V         102       AIM_30V_X102       0-33 V         106       AIM_30V_X106       0-33 V         Input for inductive encoder       Input for inductive encoder       Input for inductive encoder         19       AIM_KL_30_1       Supply voltage/Analog input (optional)         120       AIM_KL_30_2       Supply voltage/Analog input (optional)         120       AIM_KL_30_2       Supply voltage/Analog input (optional)													-			
Imput for inductive encoder       Imput for inductive encoder         Imput for inductive encoder       102         AIM_ising       Discription         Imput for inductive encoder       102         AIM_sov_X106       0-33 V         Imput for inductive encoder       103         Imput for inductive encoder       104         AIM_sov_X106       0-33 V         Imput for inductive encoder       105         Input for inductive encoder       119         AIM_sov_X106       0-33 V         Input for inductive encoder       120				· · ·	000 F 0								CAN0_L			
42       AIM_I6       DIM_I6       0-11.3 V         43       AIM_I5       DIM_I5       0-11.3 V         102       AIM_30V_X102       0-33 V         106       AIM_30V_X106       0-33 V         Input for inductive encoder         Pin       Digital input       Description         Ground/contact 13 according to DIN 72552/Digital input (optional)         120       AIM_KL_30_1       Supply voltage/Analog input (optional)         120       AIM_KL_30_2       Supply voltage/Analog input (optional)         120       AIM_KL_30_2       Supply voltage/Analog input (optional)         See page 3		-										98		VRE	F	5 V output
Harmonic Aliance       Pin       Signal       Description         102       AIM_30V_X102       0-33 V       105       DI_KL15_GSM       Battery/ignition contact 15 according to DIN 72552/Digital input (optional)         106       AIM_30V_X106       0-33 V       105       DI_KL15_GSM       Battery/ignition contact 15 according to DIN 72552/Digital input (optional)         113       DI_KL15       Battery/ignition contact 15 according to DIN 72552/Digital input (optional)         119       AIM_KL_30_1       Supply voltage/Analog input (optional)         120       AIM_KL_30_2       Supply voltage/Analog input (optional)         see page 3       Ground/contact 31 according to DIN 72552		_	_													
102       AIM_30V_X102       0-33 V         106       AIM_30V_X106       0-33 V         106       AIM_30V_X106       0-33 V         Input for inductive encoder         Pin       Digital input       Description         Description		-	-									Pov	ver supply			
Input for inductive encoder     Input for inductive encoder       Pin     Digital input     Description																
Input for inductive encoder     Input for inductive encoder       Pin     Digital input     Description							105								<u> </u>	
Input for inductive encoder         120         AIM_KL_30_2         Supply voltage/Analog input (optional)           Pin         Digital input         Description         See page 3         Ground/contact 31 according to DIN 72552	106	AIN_30V_X106		0-33 V					_		-		-	N 72552/Di	gital	input (optional)
Pin         Digital input         Description         120         AIM_KL_30_2 [Supply voltage/Analog input (optional)]           See page 3         Ground/contact 31 according to DIN 72552		Input	for inductive e	ncoder								<u> </u>	<u> </u>			
Isee page 3 I Ground/contact 31 according to DIN 72552	Pin															
	108	DI RPM 2		•	encoder	-	see page	e 3		Ground	/co	ntact 31 ac	cording to DIN 72552			

PINS - WITHOUT EXTERNAL CONNECTION

#### Pins

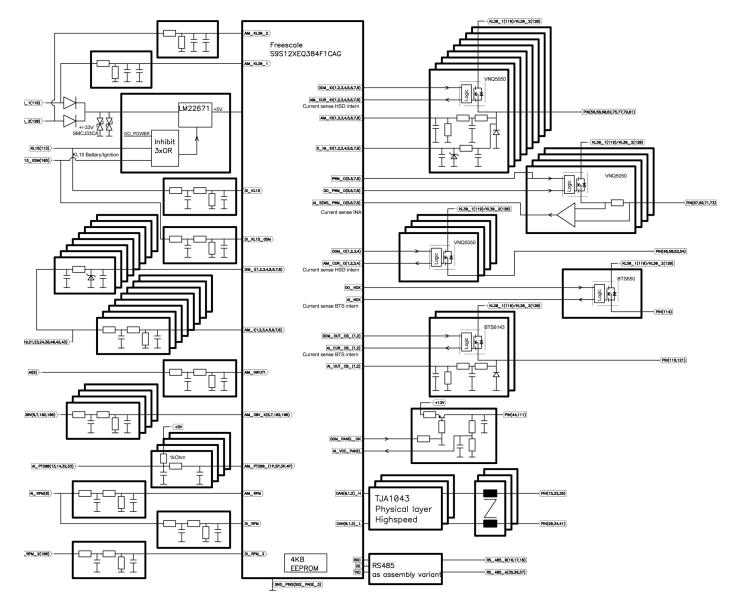
2, 5, 25, 26, 87, 88, 95, 96, 104, 107, 109, 110, 112

## PERFORMANCE TESTS HIGH-SIDE-DRIVER OUTPUTS (MAXIMUM RATINGS)

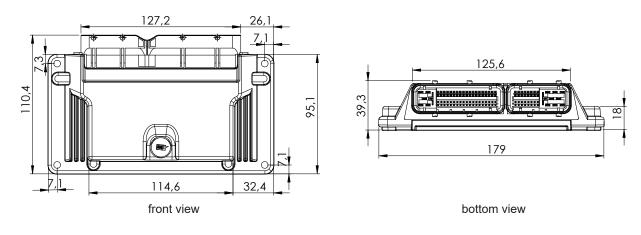
Test without PV T = 85 °C	WM (max. 2 channels per	high side driver)	Test with PWM (max. 2 channels per high side driver) T = 85 °C PWM (200Hz, Duty cycle 90%)				
Load	Switched Outputs	Endurance [min]	Load	Switched Outputs	Endurance [min]		
4 x 4 A	01-08; 101-108	5	5 A	O8	continuous		
2 x 5 A	O7, IO7	continuous	4 x 2.5 A	05,06,07,08	continuous		
15 A	IO_CB1	continuous	4 x 3 A	05,06,07,08	5		
15 A	IO_CB2	5					
22 A	NOX_B_P	5					
4 x 3 A	01,02,03,04	continuous					



# **BLOCK FUNCTION DIAGRAM**



TECHNICAL DRAWING IN MM, TOLERANCES ACCORDING TO ISO 2768-1 V





### ASSEMBLY OPTIONS AND ORDER INFORMATION

Order	Inputs						Outputs				bus	Serial	DC/
number										High- Speed	CAN open	interface	DC
	A Voltage 033 V	B Voltage or frequency	C Voltage 011.3V	D Pull up 1kΩ	E Voltage or digital	F I/O´s (optionally as Analog-/digital input or digital output)	G Digital output	H Digital output or PWM ≤ 500 Hz	l Power supply ext. panel				5 Volt Ref.
1.300.300.00	6, 7, 102, 106	8	9, 108	13, 14, 32, 33	19, 21, 23, 24, 38, 40, 42, 43	56, 58, 60, 62, 75, 77, 79 ,81, 116, 121	48, 50, 52, 54, 114	67, 69, 71, 73	111	Х		RS485	27, 98
1.300P.300.00	6, 7, 102, 106	8	9, 108	13, 14, 32, 33	19, 21, 23, 24, 38, 40, 42, 43	56, 58, 60, 62, 75, 77, 79 ,81, 116, 121	48, 50, 52, 54, 114	67, 69, 71, 73	111		Х	RS485	27, 98



# ACCESSORIES

Description	Order number
Programming tool MRS Developers Studio	1.100.100.09
Connector package M3600	114159
Crimp terminals Timer Junior 1.50 – 2.50 mm²	107665
Single seal Junior Power Timer 1.5 mm <sup>2</sup>	107304
Crimp terminal MQS 0.50 – 0.75 mm <sup>2</sup>	109949
PCAN-USB Interface	105358
Cable set M3600 for programming	501246
Cavity Plug package for M3600 CAN PLC	300972
Cable harness sheath	Available from independent retailers



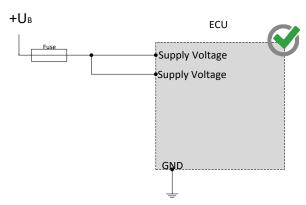
### MANUFACTURER

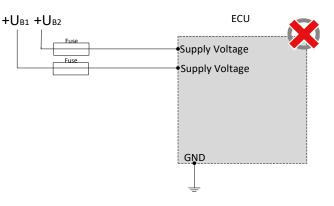
MRS Electronic GmbH & Co. KG Klaus-Gutsch-Str. 7 78628 Rottweil Germany



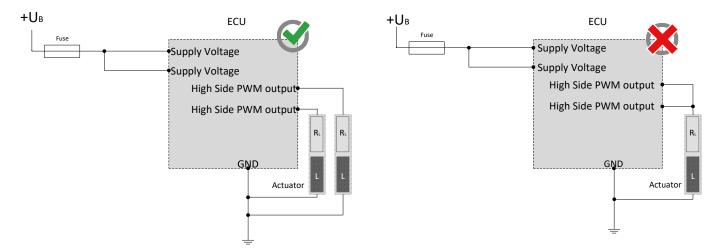
# WIRING AND CABLE ROUTING RECOMMENDATIONS

The electronic system and the power outputs of a control unit must be supplied by the same power supply system.

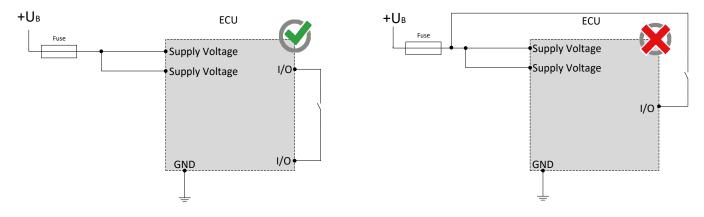




PWM outputs may not be connected with each other or bypassed.



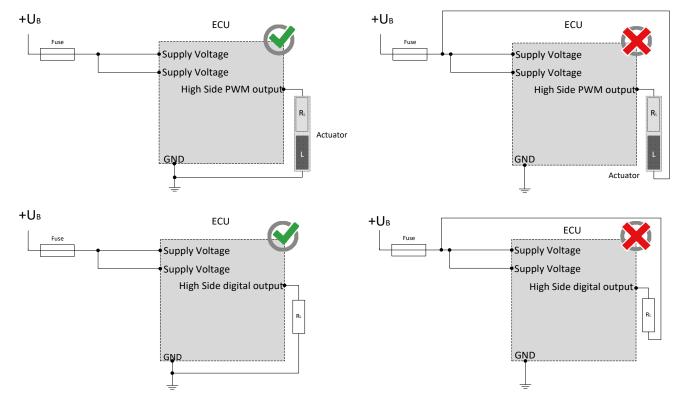
The pins (I/Os) can be used in combination and may not be switched externally against supply voltage.



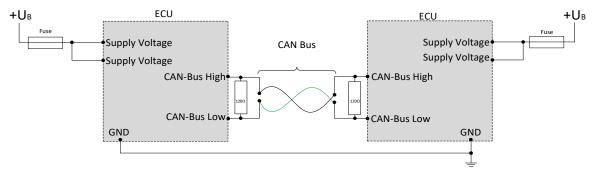


## WIRING AND CABLE ROUTING RECOMMENDATIONS

#### Higside outputs may only be switched to ground.



The CAN bus communication is the main communication between the control unit and the vehicle. Therefore, connect the CAN bus with special care and check the correct communication with the vehicle to avoid undesired behavior.



To comply with the IP protection class, the wiring harness attached to the mating connector must be routed through the cable harness sheath and the mating connector must be connected to the control unit. The cover included in the connector kit must then be closed over the mating connector. The cable harness sheath must be secured in the groove in the cover using cable ties.



### SAFETY AND INSTALLATION INFORMATION

It is essential to read the instructions in full thoroughly before working with the device.

<u>Please note and comply with the instructions in the operating instructions and the information in the device data sheet, see www.mrs-electronic.de</u> **Staff qualification:** Only staff with the appropriate qualifications may work on this device or in its proximity.

SAFETY



#### WARNING! Danger as a result of a malfunction of the entire system.

Unforeseen reactions or malfunctions of the entire system may jeopardise the safety of people or the machine.
 Ensure that the device is equipped with the correct software and that the wiring and settings on the hardware are appropriate.

#### WARNING! Danger as a result of unprotected moving components.

Unforeseen dangers may occur from the entire system when putting the device into operation and maintaining it.

- Switch the entire system off before carrying out any work and prevent it from unintentionally switching back on.
- Before putting the device into operation, ensure that the entire system and parts of the system are safe.
- The device should never be connected or separated under load or voltage.



#### CAUTION! Risk of burns from the housing.

The temperature of the device housing may be elevated.

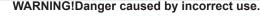
Do not touch the housing and let all system components cool before working on the system.

#### PROPER USE

•

•

The device is used to control or switch one or more electrical systems or sub-systems in motor vehicles and machines and may only be used for this purpose. The device may only be used in an industrial setting.



The device is only intended for use in motor vehicles and machines.

- Use in safety-related system parts for personal protection is not permitted.
- Do not use the device in areas where there is a risk of explosion.

#### Correct use:

- operating the device within the operating areas specified and approved in the associated data sheet.
- strict compliance with these instructions and no other actions which may jeopardise the safety of individuals or the functionality of the device.

#### Obligations of the manufacturer of entire systems

It is necessary to ensure that only functional devices are used. If devices fail or malfunction, they must be replaced immediately.

System developments, installation and the putting into operation of electrical systems may only be carried out by trained and experienced staff who are sufficiently familiar with the handling of the components used and the entire system.

It is necessary to ensure that the wiring and programming of the device does not lead to safety-related malfunctions of the entire system in the event of a failure or a malfunction. System behaviour of this type can lead to a danger to life or high levels of material damage.

The manufacturer of the entire system is responsible for the correct connection of the entire periphery (e.g. cable cross sections, correct selection/ connection of sensors/actuators).

Opening the device, making changes to the device and carrying out repairs are all prohibited. Changes or repairs made to the cabling can lead to dangerous malfunctions. Repairs may only be carried out by MRS.

#### Installation

The installation location must be selected so the device is exposed to as low a mechanical and thermal load as possible. The device may not be exposed to any chemical loads.

Install the device in such a manner that the plugs point downwards. This means condensation can flow off the device. Single seals on the cables/leads must be used to ensure that no water gets into the device.

#### Putting into operation

The device may only be put into operation by qualified staff. This may only occur when the status of the entire system corresponds to the applicable guidelines and regulations.

### FAULT CORRECTION AND MAINTENANCE



#### NOTE The device is maintenance-free and may not be opened.

If the device has damage to the housing, latches, seals or flat plugs, it must be taken out of operation.

Fault correction and cleaning work may only be carried out with the power turned off. Remove the device to correct faults and to clean it.

Check the integrity of the housing and all flat plugs, connections and pins for mechanical damage, damage caused by overheating, insulation damage and corrosion. In the event of faulty switching, check the software, switches and settings.

Do not clean the device with high pressure cleaners or steam jets. Do not use aggressive solvents or abrasive substances.