

## Data sheet

### SM 238C, Digital In-/Output, Counter, Analog In-/Output (238-2BC00)

#### Technical data

<b>Order no.</b>	<b>238-2BC00</b>
Type	SM 238C, Digital In-/Output, Counter, Analog In-/Output


#### General information

Note	-
Features	16 (12) digital inputs 0 (4) digital outputs max. 3 counter 4 analog inputs 2 analog outputs

#### Current consumption/power loss

Current consumption from backplane bus	280 mA
Power loss	5.5 W

#### Technical data digital inputs

Number of inputs	16
Cable length, shielded	1000 m
Cable length, unshielded	600 m
Rated load voltage	-
Current consumption from load voltage L+ (without load)	-
Rated value	DC 20.4...28.8 V
Input voltage for signal "0"	DC 0...5 V
Input voltage for signal "1"	DC 15...28.8 V
Input voltage hysteresis	-
Frequency range	-
Input resistance	-
Input current for signal "1"	7 mA
Connection of Two-Wire-BEROs possible	
Max. permissible BERO quiescent current	1.5 mA
Input delay of "0" to "1"	3 ms
Input delay of "1" to "0"	3 ms
Number of simultaneously utilizable inputs horizontal configuration	16
Number of simultaneously utilizable inputs vertical configuration	16
Input characteristic curve	IEC 61131-2, type 1
Initial data size	16 Byte

#### Technical data digital outputs

Number of outputs	4
Cable length, shielded	1000 m
Cable length, unshielded	600 m
Rated load voltage	DC 20.4...28.8 V
Reverse polarity protection of rated load voltage	-
Current consumption from load voltage L+ (without load)	20 mA
Total current per group, horizontal configuration, 40°C	4 A

Total current per group, horizontal configuration, 60°C	2 A
Total current per group, vertical configuration	4 A
Output voltage signal "1" at min. current	L+ (-125 mV)
Output voltage signal "1" at max. current	L+ (-0.8 V)
Output current at signal "1", rated value	1 A
Output delay of "0" to "1"	150 µs
Output delay of "1" to "0"	100 µs
Minimum load current	-
Lamp load	5 W
Parallel switching of outputs for redundant control of a load	not possible
Parallel switching of outputs for increased power	not possible
Actuation of digital input	✓
Switching frequency with resistive load	max. 1000 Hz
Switching frequency with inductive load	max. 0.5 Hz
Switching frequency on lamp load	max. 10 Hz
Internal limitation of inductive shut-off voltage	L+ (-52 V)
Short-circuit protection of output	yes, electronic
Trigger level	1.5 A
Number of operating cycle of relay outputs	-
Switching capacity of contacts	-
Output data size	16 Byte

### Technical data analog inputs

Number of inputs	4
Cable length, shielded	200 m
Rated load voltage	DC 24 V
Reverse polarity protection of rated load voltage	✓
Current consumption from load voltage L+ (without load)	70 mA
Voltage inputs	✓
Min. input resistance (voltage range)	120 kOhm
Input voltage ranges	+1 V ... +5 V 0 V ... +10 V -10 V ... +10 V -400 mV ... +400 mV -4 V ... +4 V
Operational limit of voltage ranges	+/-0.3% ... +/-0.7%
Operational limit of voltage ranges with SFU	-
Basic error limit voltage ranges with SFU	+/-0.2% ... +/-0.5%
Basic error limit voltage ranges with SFU	-
Destruction limit current	-
Current inputs	✓
Max. input resistance (current range)	90 Ohm
Input current ranges	+4 mA ... +20 mA 0 mA ... +20 mA -20 mA ... +20 mA
Operational limit of current ranges	+/-0.3% ... +/-0.8%
Operational limit of current ranges with SFU	-
Basic error limit current ranges	+/-0.2% ... +/-0.5%
Radical error limit current ranges with SFU	-
Destruction limit current inputs (electrical current)	-
Destruction limit current inputs (voltage)	-

Resistance inputs



Resistance ranges	0 ... 600 Ohm 0 ... 3000 Ohm
Operational limit of resistor ranges	+/-0.4%
Operational limit of resistor ranges with SFU	-
Basic error limit	+/-0.2%
Basic error limit with SFU	-
Destruction limit resistance inputs	-
Resistance thermometer inputs	
Resistance thermometer ranges	Pt100 Pt1000 Ni100 Ni1000
Operational limit of resistance thermometer ranges	+/-0.4% ... +/-1.0%
Operational limit of resistance thermometer ranges with SFU	-
Basic error limit thermoresistor ranges	+/-0.2% ... +/-0.5%
Basic error limit thermoresistor ranges with SFU	-
Destruction limit resistance thermometer inputs	-
Thermocouple inputs	-
Thermocouple ranges	-
Operational limit of thermocouple ranges	-
Operational limit of thermocouple ranges with SFU	-
Basic error limit thermoelement ranges	-
Basic error limit thermoresistor ranges with SFU	-
Destruction limit thermocouple inputs	-
Programmable temperature compensation	-
External temperature compensation	-
Internal temperature compensation	-
Internal temperature compensation	-
Technical unit of temperature measurement	-
Resolution in bit	16
Measurement principle	Sigma-Delta
Basic conversion time	7 ms - 272 ms
Noise suppression for frequency	50 Hz and 60 Hz
Initial data size	8 Byte

**Technical data analog outputs**

Number of outputs	2
Cable length, shielded	200 m
Rated load voltage	DC 24 V
Reverse polarity protection of rated load voltage	
Current consumption from load voltage L+ (without load)	70 mA
Voltage output short-circuit protection	
Voltage outputs	
Min. load resistance (voltage range)	1 kOhm
Max. capacitive load (current range)	1 µF
Max. inductive load (current range)	30 mA
Output voltage ranges	-10 V ... +10 V +1 V ... +5 V 0 V ... +10 V

Operational limit of voltage ranges	+/-0.4% ... +/-0.8%
Basic error limit voltage ranges with SFU	+/-0.2% ... +/-0.4%
Destruction limit against external applied voltage	-
Current outputs	✓
Max. in load resistance (current range)	500 Ohm
Max. inductive load (current range)	10 mH
Max. inductive load (current range)	13 V
Output current ranges	-20 mA ... +20 mA 0 mA ... +20 mA 0 mA ... +20 mA
Operational limit of current ranges	+/-0.3% ... +/-0.8%
Radical error limit current ranges with SFU	+/-0.2% ... +/-0.5%
	-
Settling time for ohmic load	0.3 ms
Settling time for capacitive load	1 ms
Settling time for inductive load	0.5 ms
Resolution in bit	12
Conversion time	1.50 ms
Substitute value can be applied	yes
Output data size	4 Byte

### Status information, alarms, diagnostics

Status display	yes
Interrupts	yes
Process alarm	yes, parameterizable
Diagnostic interrupt	yes, parameterizable
Diagnostic functions	yes
Diagnostics information read-out	possible
Supply voltage display	green LED per group
Group error display	red SF LED
Channel error display	none

### Isolation

Between channels	-
Between channels of groups to	-
Between channels and backplane bus	✓
Between channels and power supply	✓
Max. potential difference between circuits	-
Max. potential difference between inputs (Ucm)	DC 4 V
Max. potential difference between Mana and Mintern (Uiso)	-
Max. potential difference between inputs and Mana (Ucm)	-
Max. potential difference between inputs and Mintern (Uiso)	DC 75 V/ AC 60 V
Max. potential difference between Mintern and outputs	-
Insulation tested with	DC 500 V

### Datasizes

Input bytes	8 + 16
Output bytes	4 + 16
Parameter bytes	18 + 71
Diagnostic bytes	12 + 12

### Housing

Material	PPE / PA 6.6
Mounting	Profile rail 35 mm

### Mechanical data

Dimensions (WxHxD)	50.8 mm x 76 mm x 88 mm
Weight	150 g

### Environmental conditions

Operating temperature	0 °C to 60 °C
Storage temperature	-25 °C to 70 °C

### Certifications

UL508 certification	yes
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