

## Technical specifications

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	6ES7 134-4FB01-0AB0	6ES7 134-4LB02-0AB0	6ES7 134-4GB01-0AB0	6ES7 134-4GB52-0AB0
<b>Supply voltages</b>				
Load voltage L+				
● Rated value (DC)	24 V; From power module	24 V	24 V; From power module	24 V
● Short-circuit protection				Yes
● Reverse polarity protection	Yes	Yes	Yes; Destruction limit 35 mA per channel	Yes
Power supply to the transmitters				
● present		No		Yes
● short-circuit proof				Yes
<b>Current consumption</b>				
from load voltage L+ (without load), max.	30 mA	55 mA	80 mA	225 mA
from backplane bus 3.3 V DC, max.	10 mA	10 mA	10 mA	10 mA
<b>Current consumption/ power loss</b>				
Power loss, typ.	0.6 W	0.85 W	0.6 W	2.5 W
<b>Address area</b>				
Address space per module				
● Address space per module, max.	4 byte	4 byte	4 byte	4 byte
<b>Isochronous mode</b>				
Isochronous mode	No	Yes	No	Yes
<b>Analog inputs</b>				
Number of analog inputs	2	2	2	2
Cable length, shielded, max.	200 m	200 m	200 m	200 m
Cycle time (all channels) max.	Number of active channels per module x basic conversion time	0.5 ms; 0.5 ms for 2 channels without noise suppression, 18 / 21 ms per channel with noise suppression	Number of active channels per module x basic conversion time	0.25 ms

Technical unit for temperature measurement adjustable

● Voltage	Yes	Yes	No	No
● Current	No	No	Yes	Yes
● Thermocouple	No	No	No	No
● Resistance thermometer	No	No	No	No
● Resistance	No	No	No	No

Input ranges (rated values), voltages

● 1 to 5 V	Yes	Yes		
● Input resistance (1 to 5 V)		800 kΩ		
● -10 V to +10 V	Yes	Yes		
● Input resistance (-10 V to +10 V)		800 kΩ		
● -5 V to +5 V	Yes	Yes		
● Input resistance (-5 V to +5 V)		800 kΩ		

Input ranges (rated values), currents

● 0 to 20 mA				Yes
● Input resistance (0 to 20 mA)				106 Ω
● 4 to 20 mA			Yes; on 50 ohms	Yes

Voltage input

● permissible input voltage for voltage input (destruction limit), max.	35 V; 35 V continuous; 75 V for max. 1 ms (mark to space ratio 1:20)	35 V; 35 V continuous; 75 V for max. 1 ms		
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Current input

● permissible input current for current input (destruction limit), max.			40 mA	
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**Analog value creation**

Measurement principle	integrating		integrating	
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Integrations and conversion time/ resolution per channel

● Resolution with overrange (bit)	14 bit; +/-10 V: 13 bits + sign, +/-5 V: 13	16 bit; 0 to 5 V: 15 bits, +/-10 V: 16 bits,	13 bit; 4 to 20 mA: 13 bits	16 bit
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including sign), max.	bits + sign; 1 to 5 V: 13 bits	+/-5 V: 16 bits		
● Integration time, parameterizable		Yes		
● Integration time, ms	16.7 / 20 ms		16.7 / 20 ms	
● Interference voltage suppression for interference frequency f1 in Hz	60 / 50 Hz	60 / 50 Hz / no	60 / 50 Hz	
● Conversion time (per channel)	65 ms; 55 / 65 ms	0.04 ms; Without noise suppression 17/20 ms per channel with error	65 ms; 55 / 65 ms	
<b>Smoothing of measured values</b>				
● parameterizable	Yes; In four stages by means of digital filtering	Yes; In 4 stages: 1 x, 4 x, 16 x, 32 x cycle time	Yes; In four stages by means of digital filtering	Yes
● Step: None	Yes; 1 x cycle time	Yes; 1 x	Yes; 1 x cycle time	Yes; 1
● Step: Low	Yes; 4 x cycle time	Yes; 4 x	Yes; 4 x cycle time	Yes; 4
● Step: Medium	Yes; 32 x cycle time	Yes; 16 x	Yes; 32 x cycle time	Yes; 16
● Step: High	Yes; 64 x cycle time	Yes; 32 x	Yes; 64 x cycle time	Yes; 32
<b>Encoder</b>				
Connection of signal encoders				
● for voltage measurement		Yes		
● for current measurement as 2-wire transducer				Yes
● Burden of 2-wire transmitter, max.			750 Ω	
<b>Errors/accuracies</b>				
Linearity error (relative to input area)	+/- 0,01 %	+/- 0,01 %	+/- 0,01 %	+/- 0,03 %
Temperature error (relative to input area)	+/- 0,01 %/K	+/- 0,003 %/K	+/- 0,005 %/K	+/- 0,01 %/K
Crosstalk between the inputs, min.	-50 dB	-100 dB	-50 dB	50 dB
Repeat accuracy in settled status at 25 °C (relative to input area)	+/- 0,05 %	+/- 0,01 %	+/- 0,05 %	+/- 0,1 %
<b>Operational limit in overall temperature range</b>				
● Voltage, relative to input area	+/- 0,6 %	+/- 0,1 %; 0.2% without interference frequency suppression		
● Current, relative to input area			+/- 0,6 %	+/- 0,3 %

Basic error limit (operational limit at 25 °C)

● Voltage, relative to input area	+/- 0,4 %	+/- 0,05 %; 0.1% without interference frequency suppression		
● Current, relative to input area			+/- 0,4 %	+/- 0,2 %
Interference voltage suppression for $f = n \times (f_l \pm 1\%)$ , $f_l =$ interference frequency				
● Series mode interference (peak value of interference < rated value of input range), min.	70 dB	90 dB	70 dB	
● common mode voltage (USS < 2.5 V) , min.	90 dB	100 dB		
<b>Parameter</b>				
Remark	4 bytes	12 bytes, 4 bytes in compatibility mode	4 bytes	
Diagnosis: wire break	Disable / enable (only in measuring range 1 to 5 V)			At 4 to 20 mA
Measurement type/range	deactivated / +/-5 V / 1 to 5 V / +/-10 V	deactivated / +/-5 V / 1 to 5 V / +/-10 V	deactivated / 4 to 20 mA	4 to 20 mA, 0 to 20 mA
Interference frequency suppression				No
Group diagnostics	Disable / enable	Disable / enable	Disable / enable	1
Overflow/underflow	Disable/enable	Disable/enable	Disable/enable	1
<b>Interrupts/diagnostics/status information</b>				
Alarms				
● Process alarm		Yes		Yes
Diagnoses				
● Diagnostic functions		Yes		Yes
● Wire break	Yes; Measuring range 1 to 5 V only	Yes; Measuring range 1 to 5 V only	Yes	Yes; At 4 to 20 mA
● Group error	Yes	Yes	Yes	Yes
● Overflow/underflow	Yes	Yes	Yes	Yes
Diagnostics indication LED				
● Group error SF (red)	Yes	Yes	Yes	Yes
<b>Isolation</b>				
Isolation checked with	500 VDC	500 VDC	500 VDC	

**Galvanic isolation**

Galvanic isolation analog inputs

● between the channels	No	No; however, increased permissible potential difference between the inputs.	No	No
● between the channels and the backplane bus	Yes	Yes	Yes	Yes
● between the channels and the load voltage L+	Yes	Yes	No	Yes

**Permissible potential difference**

between the inputs (UCM)	140 V DC/100 V AC			
between inputs and MANA (UCM)	2 V AC PP			
between MANA and M internally (UISO)	75 V DC / 60 V AC			75V DC,60V AC

**Dimensions**

Module width, max.	15 mm			15 mm
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**Dimensions and weight**

Dimensions and weight				
● Width	15 mm	15 mm	15 mm	15 mm
● Height	81 mm	81 mm	81 mm	81 mm
● Depth	52 mm	52 mm	52 mm	52 mm

Weight

● Weight, approx.	40 g	45 g	40 g	
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**6ES7 134-4GB11-0AB0**

**6ES7 134-4MB02-0AB0**

**6ES7 134-4GD00-0AB0**

**6ES7 134-4FB52-0AB0**

**6ES7 134-4GB62-0AB0**

**Supply voltages**

Load voltage L+				
● Rated value (DC)	24 V; From power module	24 V	24 V; From power module	24 V
● Short-circuit protection				Yes
● Reverse polarity protection		Yes	Yes	Yes

Power supply to the transmitters

● present		Yes	Yes	Yes
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● short-circuit proof		Yes		Yes; approx. 200 mA for module		Yes
<b>Current consumption</b>						
from load voltage L+ (without load), max.	30 mA	48 mA		125 mA	80 mA	80 mA; without load
from backplane bus 3.3 V DC, max.	10 mA	10 mA		10 mA	10 mA	10 mA
<b>Current consumption/ power loss</b>						
Power loss, typ.	0.6 W	1.2 W		0.6 W	1.9 W	1.9 W
<b>Address area</b>						
Address space per module						
● Address space per module, max.	4 byte	4 byte		8 byte	4 byte	4 byte
<b>Isochronous mode</b>						
Isochronous mode	No	Yes		No	Yes	Yes
<b>Analog inputs</b>						
Number of analog inputs	2	2		4	2	2
Cable length, shielded, max.	200 m	200 m		200 m	200 m	200 m
Cycle time (all channels) max.	Number of active channels per module x basic conversion time	0.5 ms; 0.5 ms for 2 channels without noise suppression, 18 / 21 ms per channel with noise suppression		40 ms; 33 to 40 ms	250 μs	250 μs
Technical unit for temperature measurement adjustable						
● Voltage	No	No		No	Yes	No
● Current	Yes	Yes		Yes	No	Yes
● Thermocouple	No	No		No	No	No
● Resistance thermometer	No	No		No	No	No
● Resistance	No	No		No	No	No
Input ranges (rated values), voltages						
● 1 to 5 V					Yes	
● Input resistance (1 to 5 V)					120 kΩ	
					Yes	

<ul style="list-style-type: none"> <li>• -10 V to +10 V</li> </ul>					120 kΩ
<ul style="list-style-type: none"> <li>• Input resistance (-10 V to +10 V)</li> </ul>					Yes
<ul style="list-style-type: none"> <li>• -2.5 V to +2.5 V</li> </ul>					120 kΩ
<ul style="list-style-type: none"> <li>• Input resistance (-2.5 V to +2.5 V)</li> </ul>					Yes
<ul style="list-style-type: none"> <li>• -5 V to +5 V</li> </ul>					120 kΩ
<ul style="list-style-type: none"> <li>• Input resistance (-5 V to +5 V)</li> </ul>					
Input ranges (rated values), currents					
<ul style="list-style-type: none"> <li>• 0 to 20 mA</li> </ul>					Yes
<ul style="list-style-type: none"> <li>• Input resistance (0 to 20 mA)</li> </ul>					106 Ω
<ul style="list-style-type: none"> <li>• -20 to +20 mA</li> </ul>	Yes; 50 ohms	Yes			Yes
<ul style="list-style-type: none"> <li>• 4 to 20 mA</li> </ul>	Yes; 50 ohms	Yes	Yes; on 25 ohms		Yes
Voltage input					
<ul style="list-style-type: none"> <li>• permissible input voltage for voltage input (destruction limit), max.</li> </ul>					35 V; permanent
Current input					
<ul style="list-style-type: none"> <li>• permissible input current for current input (destruction limit), max.</li> </ul>	40 mA	50 mA	30 mA; limited electronically		30 mA
<b>Analog value creation</b>					
Measurement principle	integrating	Sigma Delta	integrating		
Integrations and conversion time/ resolution per channel					
<ul style="list-style-type: none"> <li>• Resolution with overrange (bit including sign), max.</li> </ul>	14 bit; +/-20 mA: 14 bits, 4 to 20 mA: 13 bits	16 bit; as required	13 bit; 4 to 20 mA: 13 bits	16 bit; 15 bits: 1 to 5 V; +/-2.5 V; 16 bit	16 bits: +/-10 V; +/-5 V
<ul style="list-style-type: none"> <li>• Integration time, parameterizable</li> </ul>		Yes	Yes		
	16.7 / 20 ms		16.67/20 ms		

● Integration time, ms					
● Interference voltage suppression for interference frequency f1 in Hz	60 / 50 Hz	60 / 50 Hz / no	60 / 50 Hz		
● Conversion time (per channel)	65 ms; 55 / 65 ms	0.04 ms; Without noise suppression 17/20 ms per channel with error			
<b>Smoothing of measured values</b>					
● parameterizable	Yes; In four stages by means of digital filtering	Yes; In 4 stages: 1 x, 4 x, 16 x, 32 x cycle time	Yes; in 4 stages	Yes	Yes
● Step: None	Yes; 1 x cycle time	Yes; 1 x	Yes; 1 x cycle time	Yes; 1 x cycle time	Yes; 1 x cycle time
● Step: Low	Yes; 4 x cycle time	Yes; 4 x	Yes; 4 x cycle time	Yes; 4 x cycle time	Yes; 4 x cycle time
● Step: Medium	Yes; 32 x cycle time	Yes; 16 x	Yes; 16 x cycle time	Yes; 16 x cycle time	Yes; 16 x cycle time
● Step: High	Yes; 64 x cycle time	Yes; 32 x	Yes; 32 x cycle time	Yes; 32 x cycle time	Yes; 32 x cycle time
<b>Encoder supply</b>					
Number of outputs					2
Output voltage					24 V
Output current, rated value					90 mA; Per channel
Output current, permissible range					0 to 90 mA
Short-circuit protection					Yes
<b>Encoder</b>					
Connection of signal encoders					
● for voltage measurement				Yes	
● for current measurement as 2-wire transducer					No
● Burden of 2-wire transmitter, max.	750 Ω	750 Ω	750 Ω		
<b>Errors/accuracies</b>					
Linearity error (relative to input area)	+/- 0,01 %	+/- 0,03 %	+/- 0,01 %	+/- 0,03 %	+/- 0,03 %
Temperature error (relative to input area)	+/- 0,005 %/K	+/- 0,03 %/K	+/- 0,003 %/K	+/- 0,01 %/K	+/- 0,01 %/K
	-50 dB	-100 dB	-50 dB	-50 dB	-50 dB

Crosstalk between the inputs, min.					
Repeat accuracy in settled status at 25 °C (relative to input area)	+/- 0,05 %	+/- 0,01 %	+/- 0,05 %	+/- 0,1 %	+/- 0,1 %
Operational limit in overall temperature range					
<ul style="list-style-type: none"> <li>Voltage, relative to input area</li> <li>Current, relative to input area</li> </ul>	+/- 0,6 %	+/- 0,1 %; 0.2% without interference frequency suppression	+/- 0,4 %	+/- 0,3 %	+/- 0,3 %
Basic error limit (operational limit at 25 °C)					
<ul style="list-style-type: none"> <li>Voltage, relative to input area</li> <li>Current, relative to input area</li> </ul>	+/- 0,4 %	+/- 0,05 %; 0.1% without interference frequency suppression	+/- 0,3 %	+/- 0,2 %	+/- 0,2 %
Interference voltage suppression for f = n x (fl +/- 1%), fl = interference frequency					
<ul style="list-style-type: none"> <li>Series mode interference (peak value of interference &lt; rated value of input range), min.</li> <li>common mode voltage (USS &lt; 2.5 V) , min.</li> </ul>	70 dB	90 dB	70 dB		
<b>Parameter</b>					
Remark	4 bytes	12 bytes, 4 bytes in compatibility mode	7 bytes	12 bytes, 4 bytes in compatibility mode	
Diagnosis: wire break	Disable / enable (only in measuring range 4 to 20 mA)	Disable / enable	1		At 4 to 20 mA
Measurement type/range	deactivated / +/-20 mA / 4 to 20 mA	deactivated / +/-20 mA / 4 to 20 mA	1	Deactivated / +/-5 V / 1 to 5 V / +/-10 V / +/-2.5 V	4 to 20 mA, 0 to 20 mA, +/-20 mA
Group diagnostics	Disable / enable	Disable / enable	1	Disable / enable	Yes
Overflow/underflow	Disable/enable	Disable/enable	1	Disable/enable	Yes
<b>Interrupts/diagnostics/status information</b>					
Alarms					
<ul style="list-style-type: none"> <li>Process alarm</li> </ul>		Yes		Yes	Yes

Diagnoses						
● Diagnostic functions		Yes		Yes; can be read out	Yes	Yes
● Diagnostic information readable					Yes	Yes
● Wire break	Yes; Measuring range 4 to 20 mA only	Yes; Measuring range 4 to 20 mA only	Yes; Measuring range 1 to 5 V only	Yes; At 1 to 5 V		Yes; Only with measuring range 4 to 20 mA
● Group error	Yes	Yes	Yes	Yes		Yes
● Overflow/underflow	Yes	Yes	Yes	Yes		Yes
Diagnostics indication LED						
● Group error SF (red)	Yes	Yes	Yes	Yes		Yes
<b>Isolation</b>						
Isolation checked with	500 VDC		500 VDC		500 VDC	
<b>Galvanic isolation</b>						
Galvanic isolation analog inputs						
● between the channels	No	No; however, increased permissible potential difference between the inputs.	No	No		No
● between the channels and the backplane bus	Yes	Yes	Yes	Yes		Yes
● between the channels and the load voltage L+	No	Yes	No	Yes		Yes
<b>Permissible potential difference</b>						
between MANA and M internally (UISO)						75V DC,60V AC
<b>Dimensions</b>						
Module width, max.		15 mm		15 mm		15 mm
<b>Dimensions and weight</b>						
Dimensions and weight						
● Width	15 mm	15 mm	15 mm	15 mm		15 mm
● Height	81 mm	81 mm	81 mm	81 mm		81 mm
● Depth	52 mm	52 mm	52 mm	52 mm		52 mm
Weight						
	40 g	45 g	40 g	45 g		45 g

- Weight, approx.

	6ES7 134-4JB50-0AB0	6ES7 134-4NB51-0AB0	6ES7 134-4JB00-0AB0	6ES7 134-4NB01-0AB0
<b>Supply voltages</b>				
Load voltage L+				
● Rated value (DC)	24 V; From power module	24 V; From power module	24 V; From power module	24 V; From power module
● Reverse polarity protection	Yes	Yes	Yes	Yes
Power supply to the transmitters				
● present	Yes			
● short-circuit proof	Yes			
<b>Current consumption</b>				
from load voltage L+ (without load), max.	30 mA	30 mA	30 mA	30 mA
from backplane bus 3.3 V DC, max.	10 mA	10 mA	10 mA	10 mA
<b>Current consumption/ power loss</b>				
Power loss, typ.	0.6 W	0.6 W	0.6 W	0.6 W
<b>Address area</b>				
Address space per module				
● Address space per module, max.	4 byte	4 byte	4 byte	4 byte
<b>Isochronous mode</b>				
Isochronous mode	No	No	No	
<b>Analog inputs</b>				
Number of analog inputs	2	2	2	2
Cable length, shielded, max.	200 m	200 m	50 m	50 m
Constant measurement current for resistance-type transmitter, typ.	1.5 mA	1.25 mA		
Cycle time (all channels) max.	Number of active channels per module x basic conversion time	Number of active channels per module x basic conversion time	Number of active channels per module x basic conversion time	Number of active channels per module x basic conversion time
Technical unit for temperature measurement adjustable		Yes		Yes
		Yes	Yes	Yes

● Voltage			
● Current		No	No
● Thermocouple		Yes	Yes
● Resistance thermometer	Yes	Yes	No
● Resistance	Yes	Yes	No
Input ranges (rated values), voltages			
● -80 mV to +80 mV		Yes	Yes
● Input resistance (-80 mV to +80 mV)		1 MΩ	1 MΩ
Input ranges (rated values), thermoelements			
● Type B		Yes	Yes
● Input resistance (Type B)		1 MΩ	1 MΩ
● Type C			Yes
● Input resistance (Type C)			1 MΩ
● Type E		Yes	Yes
● Input resistance (Type E)		1 MΩ	1 MΩ
● Type J		Yes	Yes
● Input resistance (type J)		1 MΩ	1 MΩ
● Type K		Yes	Yes
● Input resistance (Type K)		1 MΩ	1 MΩ
● Type L		Yes	Yes
● Input resistance (Type L)		1 MΩ	1 MΩ
● Type N		Yes	Yes
● Input resistance (Type N)		1 MΩ	1 MΩ
● Type R		Yes	Yes
● Input resistance (Type R)		1 MΩ	1 MΩ
● Type S		Yes	Yes

● Input resistance (Type S)			1 MΩ	1 MΩ
● Type T			Yes	Yes
● Input resistance (Type T)			1 MΩ	1 MΩ
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Input ranges (rated values), resistance thermometers				
● Cu 10			Yes	
● Input resistance (Cu 10)			10 MΩ	
● Ni 100	Yes; Standard/climate		Yes	
● Input resistance (Ni 100)	2 000 kΩ		10 MΩ	
● Ni 1000			Yes	
● Input resistance (Ni 1000)			10 MΩ	
● Ni 120			Yes	
● Input resistance (Ni 120)			10 MΩ	
● Ni 200			Yes	
● Input resistance (Ni 200)			10 MΩ	
● Ni 500			Yes	
● Input resistance (Ni 500)			10 MΩ	
● Pt 100	Yes; Standard / climate		Yes	
● Input resistance (Pt 100)	2 000 kΩ		10 MΩ	
● Pt 1000			Yes	
● Input resistance (Pt 1000)			10 MΩ	
● Pt 200			Yes	
● Input resistance (Pt 200)			10 MΩ	
● Pt 500			Yes	
● Input resistance (Pt 500)			10 MΩ	
<hr/>				
Input ranges (rated values), resistors				
	Yes		Yes	

<ul style="list-style-type: none"> <li>● 0 to 150 ohms</li> </ul>				
<ul style="list-style-type: none"> <li>● Input resistance (0 to 150 ohms)</li> </ul>	2 000 kΩ	10 MΩ		
<ul style="list-style-type: none"> <li>● 0 to 300 ohms</li> </ul>	Yes	Yes		
<ul style="list-style-type: none"> <li>● Input resistance (0 to 300 ohms)</li> </ul>	2 000 kΩ	10 MΩ		
<ul style="list-style-type: none"> <li>● 0 to 600 ohms</li> </ul>	Yes	Yes		
<ul style="list-style-type: none"> <li>● Input resistance (0 to 600 ohms)</li> </ul>	2 000 kΩ	10 MΩ		
<ul style="list-style-type: none"> <li>● 0 to 3000 ohms</li> </ul>		Yes		
<ul style="list-style-type: none"> <li>● Input resistance (0 to 3000 ohms)</li> </ul>		10 MΩ		
<b>Voltage input</b>				
<ul style="list-style-type: none"> <li>● permissible input voltage for voltage input (destruction limit), max.</li> </ul>	9 V	9 V	10 V; permanent	20 V; +/-20 V, continuous
<b>Characteristic linearization</b>				
<ul style="list-style-type: none"> <li>● parameterizable</li> </ul>	Yes; for Pt100, Ni100	Yes; for Ptxxx, Nixxx	Yes; Type B, E, J, K, L, N, R, S, T to IEC 584	Yes
<ul style="list-style-type: none"> <li>● for thermocouples</li> </ul>				Type B, C, E, J, K, L, N, R, S, T to IEC 584
<ul style="list-style-type: none"> <li>● for resistance thermometer</li> </ul>	Pt100, Ni100	Ptxxx, Nixxx		
<b>Temperature compensation</b>				
<ul style="list-style-type: none"> <li>● internal temperature compensation</li> </ul>		Yes	Not possible	Yes; possible with TM-E15S24-AT, TM-E15C24-AT
<ul style="list-style-type: none"> <li>● external temperature compensation with compensations socket</li> </ul>			Yes; possible, one external compensating box per channel	Yes; one external compensating box per channel
<b>Analog value creation</b>				
Measurement principle	integrating	integrating (Sigma-Delta)	integrating	integrating
<b>Integrations and conversion time/ resolution per channel</b>				
<ul style="list-style-type: none"> <li>● Resolution with overrange (bit including sign), max.</li> </ul>	16 bit; 150 ohms: 14 bits; 300, 600 ohms: 15 bits, Pt100, Ni100: 16 bits	16 bit; for Pt100, Ni100, Ni120, Pt200, Ni200, Pt 500, Ni 500, Pt1000, Ni1000, Cu10: 15 bits + sign; for 150, 300, 600, 3000 ohms: 15 bits; for PTC: 1 bits	16 bit; 15 bits + sign	16 bit
<ul style="list-style-type: none"> <li>● Integration time, parameterizable</li> </ul>	Yes		Yes	
	16.7 / 20 ms	16.7 / 20 ms	16.7 / 20 ms	16.7 / 20 ms

● Integration time, ms				
● Interference voltage suppression for interference frequency f1 in Hz	60 / 50 Hz	60 / 50 Hz	60 / 50 Hz	60 / 50 Hz
● Conversion time (per channel)	110 ms; 110 / 130 ms	Basic conversion time incl. integration time: 50 / 60 ms; additional conversion time for diagnostic wire break test: 5 / 5 ms; additional conversion time for line compensation with 3-core connection: 50 / 60 ms	65 ms; 55 / 65 ms (additional 20 ms on activated wire-break test)	66 ms; 66 / 80 ms; additional conversion time for diagnostic wire break test
<b>Smoothing of measured values</b>				
● parameterizable	Yes; In four stages by means of digital filtering	Yes; In four stages by means of digital filtering	Yes; In four stages by means of digital filtering	Yes; In four stages by means of digital filtering
● Step: None	Yes; 1 x cycle time	Yes; 1 x cycle time	Yes; 1 x cycle time	Yes; 1 x cycle time
● Step: Low	Yes; 4 x cycle time	Yes; 4 x cycle time	Yes; 4 x cycle time	Yes; 4 x cycle time
● Step: Medium	Yes; 64 x cycle time	Yes; 32 x cycle time	Yes; 32 x cycle time	Yes; 32 x cycle time
● Step: High	Yes; 128x cycle time	Yes; 64 x cycle time	Yes; 64 x cycle time	Yes; 64 x cycle time
<b>Encoder</b>				
Connection of signal encoders				
● for voltage measurement			Yes	
● for resistance measurement with 2-conductor connection	Yes; Line resistances are also measured, jumpers to TR	Yes		
● for resistance measurement with 3-conductor connection	Yes; Line resistances are also measured, jumpers to TR	Yes; internal compensation of the line resistances		
● for resistance measurement with 4-conductor connection	Yes	Yes		
● Burden of 2-wire transmitter, max.	750 Ω			
<b>Errors/accuracies</b>				
Linearity error (relative to input area)	+/- 0,01 %	+/- 0,01 %	+/- 0,01 %	+/- 0,01 %
Temperature error (relative to input area)	+/- 0,005 %/K	+/- 0,0009 %/K	+/- 0,005 %/K	+/- 0,005 %/K
Crosstalk between the inputs, min.	-50 dB	-50 dB	-50 dB	-50 dB
Repeat accuracy in settled status at 25 °C (relative to input area)	+/- 0,05 %	+/- 0,05 %	+/- 0,05 %	+/- 0,05 %

Operational limit in overall temperature range

<ul style="list-style-type: none"> <li>● Voltage, relative to input area</li> </ul>			+/- 0,6 %	+/- 0,1 %; +/-1.5 K for thermocouples, +/- 7 K for thermocouples type C, +/-2.5 K with static thermal state (ambient temperature change < 0.3 K/min)
<ul style="list-style-type: none"> <li>● Resistance-type thermometer, relative to input area</li> </ul>	+/- 0,6 %	Resistance-type transmitter: +/-0.1%; Pt100, Pt200, Pt500, Pt1000 standard: +/- 1.0 K; Pt100, Pt200, Pt500, Pt1000 climate: +/-0.25 K; Ni100, Ni120, Ni200, Ni500, Ni1000 standard and climate: +/- 0.4 K; Cu10 +/-1.5 K		

Basic error limit (operational limit at 25 °C)

<ul style="list-style-type: none"> <li>● Voltage, relative to input area</li> </ul>			+/- 0,4 %	+/- 0,05 %; +/-1 K with thermocouples, +/-5 K with thermocouples type C, +/-1.5 K with static thermal state (ambient temperature change < 0.3 K/min)
<ul style="list-style-type: none"> <li>● Resistance-type thermometer, relative to input area</li> </ul>	+/- 0,4 %	Resistance-type transmitter: +/-0.05%; Pt100, Pt200, Pt500, Pt1000 standard: +/- 0.6 K; Pt100, Pt200, Pt500, Pt1000 climate: +/-0.13 K; Ni100, Ni120, Ni200, Ni500, Ni1000 standard and climate: +/- 0.2 K; Cu10 +/-1 K		

Interference voltage suppression for f = n x (fl +/- 1%), fl = interference frequency

<ul style="list-style-type: none"> <li>● Series mode interference (peak value of interference &lt; rated value of input range), min.</li> </ul>	70 dB	70 dB	70 dB	70 dB
<ul style="list-style-type: none"> <li>● common mode voltage (USS &lt; 2.5 V) , min.</li> </ul>	90 dB	90 dB	90 dB	90 dB

Parameter	4 bytes	7 bytes	4 bytes	4 bytes
Remark	4 bytes	7 bytes	4 bytes	4 bytes
Diagnosis: wire break	Disable / enable (wire break is detected only on constant current lines)	Disable / enable	Disable / enable (wire break is detected only in thermocouples)	Disable / enable (wire break is detected only in thermocouples)
Measurement type/range	deactivated/150 ohms/; 300 ohms/600 ohms/; Pt100 climatic/ Pt100 standard; Ni100 standard / Ni100 climatic	deactivated/ 150 ohms/ 300 ohms/ 600 ohms/Pt100/ Pt200/ Pt500/ Pt1000 each standard or climate range/ Ni100/ Ni120/	Deactivated/ +/- 80 mV/ +/- 250 mV/ +/- 500 mV/ +/- 1 V / TC-EL Type T (Cu-CuNi)/ TC-EL Type K (NiCr-Ni)/ TC-EL	Deactivated/ +/- 80 mV/ TC-EL Type T (Cu-CuNi)/ TC-EL Type K (NiCr-Ni)/ TC-EL Type B (PtRh-PtRh)/ TC-EL Type c

		Ni200/ Ni500/ Ni1000 each standard or climate range/ Cu10 each standard or climate range / PTC	Type B (PtRh-PtRh)/ TC-EL Type N (NiCrSi-NiSi)/ TC-EL Type E (NiCr-CuNi)/ TC-EL Type R (PtRh-Pt)/ TC-EL Type S (PtRh-Pt)/ TC-EL Typ J	(Wer-Wer) TC-EL Type N (NiCrSi-NiSi)/ TC-EL Type E (NiCr-CuNi)/ TC-EL Type R (PtRh-Pt)/ TC-EL Type S (PtRh-Pt)/ TC-EL Type J (Fe-Cu-Ni)/ TC
Group diagnostics	Disable / enable	Disable / enable	Disable / enable	Disable / enable
Slot comparison point 1 to 8			Disable/enable	
Overflow/underflow	Disable/enable	Disable/enable	Disable/enable	Disable/enable
Comparison point			none / RTD	none / yes, internal
Comparison point number			none / 1 / 2 / 3 / 4 / 5 / 6 / 7 / 8	
Unit			Celsius	Celsius / Fahrenheit
<b>Interrupts/diagnostics/status information</b>				
Diagnoses				
● Diagnostic functions	Yes; can be read out		Yes; can be read out	
● Wire break	Yes; Wire break is detected only on constant current lines	Yes	Yes; A break in the wire is only detected for thermocouples	Yes; only thermocouples
● Group error	Yes	Yes	Yes	Yes
● Overflow/underflow	Yes	Yes	Yes	Yes
Diagnostics indication LED				
● Group error SF (red)	Yes	Yes	Yes	Yes
<b>Isolation</b>				
Isolation checked with	500 VDC	500 VDC	500 VDC	500 VDC
<b>Galvanic isolation</b>				
Galvanic isolation analog inputs				
● between the channels	No	No	No	No
● between the channels and the backplane bus	Yes	Yes	Yes	Yes
● between the channels and the load voltage L+	Yes	Yes	Yes	Yes
<b>Permissible potential difference</b>				
between inputs and MANA (UCM)			2 V AC PP	140 V DC/100 V AC
between MANA and M internally (UIISO)	75 V DC / 60 V AC	75 V DC / 60 V AC	75 V DC / 60 V AC	75 V DC / 60 V AC
<b>Dimensions and weight</b>				

Dimensions and weight				
● Width	15 mm	15 mm	15 mm	15 mm
● Height	81 mm	81 mm	81 mm	81 mm
● Depth	52 mm	52 mm	52 mm	52 mm
Weight				
● Weight, approx.	40 g	40 g	40 g	40 g

	6ES7 135-4FB01-0AB0	6ES7 135-4FB52-0AB0	6ES7 135-4LB02-0AB0
<b>Supply voltages</b>			
Load voltage L+			
● Rated value (DC)	24 V; From power module	24 V; From power module	24 V
● Reverse polarity protection	Yes	Yes	Yes
<b>Current consumption</b>			
from load voltage L+ (without load), max.	130 mA	100 mA	80 mA
from backplane bus 3.3 V DC, max.	10 mA	10 mA	10 mA
<b>Current consumption/ power loss</b>			
Power loss, max.	2 W	2 W	1.2 W
<b>Address area</b>			
Address space per module			
● Address space per module, max.	4 byte	4 byte	4 byte
<b>Isochronous mode</b>			
Isochronous mode		Yes	Yes
<b>Analog outputs</b>			
Number of analog outputs	2	2	2
Cable length, shielded, max.	200 m	200 m; max. 20m for TWA 100µs	200 m; 100m if Twa < 2ms
Voltage output, short-circuit protection	Yes	Yes	Yes
Voltage output, short-circuit current, max..	25 mA	25 mA	25 mA
Cycle time (all channels) max.	1.5 ms	0.25 ms	0.5 ms; At max. 0.5 µF
Output ranges, voltage			

● 1 to 5 V	Yes	Yes	Yes; -5 to +5 V also implemented
● -10 to +10 V	Yes	Yes; +/-5V as well	Yes
<b>Connection of actuators</b>			
● for voltage output 2-conductor connection	Yes; Without compensation of the line resistances	Yes; Without compensation of the line resistances	Yes
● for voltage output 4-conductor connection	Yes	Yes	Yes
<b>Load impedance (in rated range of output)</b>			
● with voltage outputs, min.	1 kΩ	1 kΩ	1 kΩ
● with voltage outputs, capacitive load, max.	1 μF	1 μF; 0.1μF for Twa=0.1ms	0.5 μF
<b>Destruction limits against externally applied voltages and currents</b>			
● Voltages at the outputs towards MANA	15 V; max. 15 V continuous; 75 V for max. 1 s (mark to space ratio 1:20)	15 V; Max. 15 V for max. 5 hours, 75 V for max. 1 s	15 V; as required
● Current, max.	50 mA; DC	30 mA; DC	
<b>Analog value creation</b>			
Integrations and conversion time/ resolution per channel			
● Resolution with overrange (bit including sign), max.	14 bit; 1 to 5 V: 12 bits, +/-10 V: 13 bits + sign	16 bit; 1 to 5 V: 14 bits, +/-10 V: 15 bit + sign, +/-5 V: 14 bits + sign	16 bit; 15 bits + sign
<b>Settling time</b>			
● for resistive load	0.1 ms	0.05 ms	0.2 ms
● for capacitive load	0.5 ms	0.05 ms	0.5 ms; at max. 0.5μF
● for inductive load	0.5 ms	0.05 ms	0.5 ms
<b>Errors/accuracies</b>			
Output ripple (based on output area, bandwidth 0 to 50 kHz)	+/- 0,02 %	+/- 0,02 %	+/- 0,02 %
Linearity error (relative to output area)	+/- 0,02 %	+/- 0,03 %	+/- 0,01 %
Temperature error (relative to output area)	+/- 0,01 %/K	+/- 0,01 %/K	
Crosstalk between the outputs, min.		60 dB	60 dB
Repeat accuracy in settled status at 25 °C (relative to output area)	+/- 0,05 %	+/- 0,03 %	+/- 0,01 %

Operational limit in overall temperature range			
● Voltage, relative to output area	+/- 0,4 %	+/- 0,2 %	+/- 0,1 %
Basic error limit (operational limit at 25 °C)			
● Voltage, relative to output area	+/- 0,2 %	+/- 0,01 %	+/- 0,05 %
<b>Parameter</b>			
Remark	7 bytes	7	7 bytes
Output type/range	deactivated / 1 to 5 V / +/- -10 V	deactivated / 1 to 5 V / +/- -10 V / +/- 5 V	deactivated / 1 to 5 V / +/- -10 V / +/- 5 V
Diagnosis: short circuit	Disable / enable	Disable / enable	Disable / enable
Interference frequency suppression			no
Group diagnostics	Disable / enable	Disable / enable	Disable / enable
Behavior on CPU/Master STOP	Output current and de-energized/substitute a value/keep last value	Output current and de-energized/substitute a value/keep last value	Output current and de-energized/substitute a value/keep last value
<b>Interrupts/diagnostics/status information</b>			
Substitute values connectable	Yes; 0 to 65535 (range of values must be within the rated range)	Yes; 0 to 65535 (range of values must be within the rated range)	Yes
Diagnoses			
● Diagnostic functions		Yes	
● Diagnostic information readable		Yes	Yes
● Wire break		No	
● Short circuit	Yes	Yes	Yes
● Group error	Yes	Yes	Yes
Diagnostics indication LED			
● Group error SF (red)	Yes	Yes	Yes
<b>Isolation</b>			
Isolation checked with			500 VDC
<b>Galvanic isolation</b>			
Galvanic isolation analog outputs			
● between the channels	No	No	No
● between the channels and the backplane bus	Yes	Yes	Yes
	Yes	Yes	Yes

- between the channels and the load voltage L+

<b>Permissible potential difference</b>			
between MANA and M internally (UISO)	75 V DC / 60 V AC	75 V DC / 60 V AC	75 V DC / 60 V AC
<b>Dimensions and weight</b>			
Dimensions and weight			
● Width	15 mm	15 mm	15 mm
● Height	81 mm	81 mm	81 mm
● Depth	52 mm	52 mm	52 mm
Weight			
● Weight, approx.	40 g	40 g	40 g
	<b>6ES7 135-4GB01-0AB0</b>	<b>6ES7 135-4MB02-0AB0</b>	<b>6ES7 135-4GB52-0AB0</b>
<b>Supply voltages</b>			
Load voltage L+			
● Rated value (DC)	24 V; From power module	24 V	24 V
● Reverse polarity protection	Yes	Yes	Yes
<b>Current consumption</b>			
from load voltage L+ (without load), max.	150 mA	80 mA	150 mA; with load
from backplane bus 3.3 V DC, max.	10 mA	10 mA	10 mA
<b>Current consumption/ power loss</b>			
Power loss, max.	2 W	1.2 W	2.4 W; Typical
<b>Address area</b>			
Address space per module			
● Address space per module, max.	4 byte	4 byte	4 byte
<b>Isochronous mode</b>			
Isochronous mode			
		Yes	Yes
<b>Analog outputs</b>			
Number of analog outputs			
	2	2	2
Cable length, shielded, max.			
	200 m	200 m; 100m if Twa < 2ms	200 m; max. 20m for TWA 100µs

Current output, no-load voltage, max.	18 V	18 V	18 V
Cycle time (all channels) max.	1.5 ms	0.5 ms	250 µs
Output ranges, current			
● -20 to +20 mA	Yes	Yes	Yes
● 4 to 20 mA	Yes	Yes	Yes
Connection of actuators			
● for current output 2-conductor connection	Yes	Yes	Yes
● for current output 4-conductor connection	No	No	
Load impedance (in rated range of output)			
● with current outputs, max.	500 Ω	500 Ω	500 Ω
● with current outputs, inductive load, max.	1 mH	1 mH	1 mH; for TWA 100µs
Destruction limits against externally applied voltages and currents			
● Voltages at the outputs towards MANA	15 V; max. 15 V continuous; 75 V for max. 1 s (mark to space ratio 1:20)		
● Current, max.	50 mA; DC	50 mA	15 mA; Max. 15 V/5 hours (higher voltages not permissible even briefly)
<b>Analog value creation</b>			
Integrations and conversion time/ resolution per channel			
● Resolution with overrange (bit including sign), max.	14 bit; 4 to 20 mA: 13 bits, +/-20 mA: 14 bits	16 bit	16 bit
Settling time			
● for resistive load	0.1 ms	0.3 ms	0.05 ms
● for capacitive load	0.5 ms	1 ms	0.05 ms; at a load of up to 500 ohms/100 nF and a max. cable length of 20 m
● for inductive load	0.5 ms	0.5 ms	0.05 ms
<b>Ex(i) characteristics</b>			
Max. values of output circuits (per channel)			
● U <sub>o</sub> (output no-load voltage), max.	18 V		
<b>Errors/accuracies</b>			

Output ripple (based on output area, bandwidth 0 to 50 kHz)	+/- 0,02 %	+/- 0,02 %	+/- 0,02 %
Linearity error (relative to output area)	+/- 0,02 %	+/- 0,01 %	+/- 0,03 %; with resistive load
Temperature error (relative to output area)	+/- 0,01 %/K	+/- 0,003 %/K	+/- 0,01 %/K
Crosstalk between the outputs, min.		60 dB	-60 dB
Repeat accuracy in settled status at 25 °C (relative to output area)	+/- 0,05 %	+/- 0,01 %	+/- 0,03 %
Operational limit in overall temperature range			
<ul style="list-style-type: none"> <li>Current, relative to output area</li> </ul>	+/- 0,5 %	+/- 0,1 %	+/- 0,2 %; Specified value applies for loads from 200 to 350 ohms, deviating operational limits for loads up to 200 ohms and from 350 to 500 ohms with up to 0.4%
Basic error limit (operational limit at 25 °C)			
<ul style="list-style-type: none"> <li>Current, relative to output area</li> </ul>	+/- 0,3 %	+/- 0,05 %	+/- 0,1 %; Specified value applies for loads from 200 to 350 ohms, deviating basic error limits for loads up to 200 ohms and from 350 to 500 ohms with up to 0.3%
<b>Parameter</b>			
Remark	7 bytes	7 bytes	7 bytes
Output type/range	deactivated / +/-20 mA / 4 to 20 mA	deactivated / +/-20 mA / 4 to 20 mA	deactivated / +/-20 mA / 4 to 20 mA
Diagnosis: wire break	Disable/enable	Disable/enable	Disable/enable
Interference frequency suppression		disable / enable	
Group diagnostics	Disable / enable	Disable / enable	Disable / enable
Behavior on CPU/Master STOP	Output current and de-energized/substitute a value/keep last value	Output current and de-energized/substitute a value/keep last value	Output current and de-energized/substitute a value/keep last value
<b>Interrupts/diagnostics/status information</b>			
Substitute values connectable	Yes; 0 to 65535 (range of values must be within the rated range)	Yes	Yes
Diagnoses			
<ul style="list-style-type: none"> <li>Diagnostic functions</li> </ul>			Yes
<ul style="list-style-type: none"> <li>Diagnostic information readable</li> </ul>		Yes	Yes
<ul style="list-style-type: none"> <li>Wire break</li> </ul>	Yes	Yes	Yes
<ul style="list-style-type: none"> <li>Group error</li> </ul>	Yes	Yes	Yes

Diagnostics indication LED			
● Group error SF (red)	Yes	Yes	Yes
<b>Isolation</b>			
Isolation checked with		500 VDC	500 VDC
<b>Galvanic isolation</b>			
Galvanic isolation analog outputs			
● Galvanic isolation analog outputs		Yes	Yes
● between the channels	No	No	No
● between the channels and the backplane bus	Yes	Yes	Yes
● between the channels and the load voltage L+	Yes	Yes	Yes
<b>Permissible potential difference</b>			
between MANA and M internally (UISO)		75 V DC / 60 V AC	75 V DC / 60 V AC
<b>Dimensions and weight</b>			
Dimensions and weight			
● Width	15 mm	15 mm	15 mm
● Height	81 mm	81 mm	81 mm
● Depth	52 mm	52 mm	52 mm
Weight			
● Weight, approx.	40 g	40 g	45 g