Data sheet 6ES7531-7KF00-0AB0



SIMATIC S7-1500 analog input module AI 8xU/I/RTD/TC ST, 16 bit resolution, accuracy 0.3%, 8 channels in groups of 8; 4 channels for RTD measurement, common mode voltage 10 V; Diagnostics; Hardware interrupts; Delivery including infeed element, shield bracket and shield terminal: Front connector (screw terminals or push-in) to be ordered separately

General information	
Product type designation	AI 8xU/I/RTD/TC ST
HW functional status	FS04
Firmware version	V2.0.0
 FW update possible 	Yes
Product function	
● I&M data	Yes; I&M0 to I&M3
 Isochronous mode 	No
 Prioritized startup 	No
 Measuring range scalable 	No
 Scalable measured values 	No
 Adjustment of measuring range 	No
Engineering with	
 STEP 7 TIA Portal configurable/integrated from version 	V12 / V12
 STEP 7 configurable/integrated from version 	V5.5 SP3 / -
 PROFIBUS from GSD version/GSD revision 	V1.0 / V5.1
 PROFINET from GSD version/GSD revision 	V2.3 / -
Operating mode	
 Oversampling 	No
• MSI	Yes
CiR - Configuration in RUN	
Reparameterization possible in RUN	Yes
Calibration possible in RUN	Yes
Supply voltage	
Rated value (DC)	24 V
permissible range, lower limit (DC)	19.2 V
permissible range, upper limit (DC)	28.8 V
Reverse polarity protection	Yes
Input current	
Current consumption, max.	240 mA; with 24 V DC supply
Encoder supply	
24 V encoder supply	
Short-circuit protection	Yes
 Output current, max. 	20 mA; Max. 47 mA per channel for a duration < 10 s
Power	
Power available from the backplane bus	0.7 W
Power loss	
Power loss, typ.	2.7 W
Analog inputs	
Number of analog inputs	8

- For ourself recovered	0
For current measurement	8
For voltage measurement	8
For resistance/resistance thermometer measurement	4
For thermocouple measurement	8
permissible input voltage for voltage input (destruction limit), max.	28.8 V
permissible input current for current input (destruction limit), max.	40 mA
Constant measurement current for resistance-type transmitter, typ.	150 Ohm, 300 Ohm, 600 Ohm, Pt100, Pt200, Ni100: 1.25 mA; 6 000 Ohm, Pt500, Pt1000, Ni1000, LG-Ni1000: 0.625 mA; PTC: 0.472 mA
Technical unit for temperature measurement adjustable	Yes; °C/°F/K
Input ranges (rated values), voltages	
• 0 to +5 V	No
• 0 to +10 V	No
• 1 V to 5 V	Yes
— Input resistance (1 V to 5 V)	100 kΩ
• -1 V to +1 V	Yes
— Input resistance (-1 V to +1 V)	10 MΩ
• -10 V to +10 V	Yes
— Input resistance (-10 V to +10 V)	Tes 100 kΩ
- Input resistance (-10 V to +10 V) • -2.5 V to +2.5 V	Yes
	res 10 MΩ
— Input resistance (-2.5 V to +2.5 V)	
• -25 mV to +25 mV	No Voc
• -250 mV to +250 mV	Yes
— Input resistance (-250 mV to +250 mV)	10 MΩ
• -5 V to +5 V	Yes
— Input resistance (-5 V to +5 V)	100 kΩ
● -50 mV to +50 mV	Yes
— Input resistance (-50 mV to +50 mV)	10 ΜΩ
● -500 mV to +500 mV	Yes
— Input resistance (-500 mV to +500 mV)	10 ΜΩ
● -80 mV to +80 mV	Yes
— Input resistance (-80 mV to +80 mV)	10 ΜΩ
Input ranges (rated values), currents	
• 0 to 20 mA	Yes
— Input resistance (0 to 20 mA)	25 Ω ; Plus approx. 42 ohms for overvoltage protection by PTC
• -20 mA to +20 mA	Yes
— Input resistance (-20 mA to +20 mA)	25 Ω ; Plus approx. 42 ohms for overvoltage protection by PTC
• 4 mA to 20 mA	Yes
— Input resistance (4 mA to 20 mA)	25 Ω ; Plus approx. 42 ohms for overvoltage protection by PTC
Input ranges (rated values), thermocouples	
• Type B	Yes
— Input resistance (Type B)	10 ΜΩ
• Type C	No
• Type E	Yes
— Input resistance (Type E)	10 ΜΩ
• Type J	Yes
— Input resistance (type J)	10 ΜΩ
• Type K	Yes
— Input resistance (Type K)	10 MΩ
• Type L	No
• Type N	Yes
Input resistance (Type N)	10 MΩ
Type R	Yes
	10 MΩ
— Input resistance (Type R)	
Type S Input registance (Type S)	Yes
— Input resistance (Type S)	10 ΜΩ
• Type T	Yes
— Input resistance (Type T)	10 ΜΩ
Type TXK/TXK(L) to GOST	No
Input ranges (rated values), resistance thermometer	
	No

 Cu 10 according to GOST 	No
• Cu 50	No
 Cu 50 according to GOST 	No
• Cu 100	No
 Cu 100 according to GOST 	No
• Ni 10	No
Ni 10 according to GOST	No
• Ni 100	Yes; Standard/climate
— Input resistance (Ni 100)	10 ΜΩ
Ni 100 according to GOST	No
• Ni 1000	Yes; Standard/climate
— Input resistance (Ni 1000)	10 ΜΩ
Ni 1000 according to GOST	No
• LG-Ni 1000	Yes; Standard/climate
— Input resistance (LG-Ni 1000)	10 ΜΩ
• Ni 120	No
Ni 120 according to GOST	No
Ni 200 according to GOST	No
• Ni 500	No
Ni 500 according to GOST	No
• Pt 10	No
Pt 10 according to GOST	No
• Pt 50	No
Pt 50 according to GOST	No
• Pt 100	Yes; Standard/climate
— Input resistance (Pt 100)	10 ΜΩ
Pt 100 according to GOST	No
• Pt 1000	Yes; Standard/climate
— Input resistance (Pt 1000)	10 ΜΩ
Pt 1000 according to GOST	No
• Pt 200	Yes; Standard/climate
— Input resistance (Pt 200)	10 ΜΩ
Pt 200 according to GOST	No
• Pt 500	Yes; Standard/climate
— Input resistance (Pt 500)	10 MΩ
Pt 500 according to GOST	No
Input ranges (rated values), resistors	INC
• 0 to 150 ohms	Yes
— Input resistance (0 to 150 ohms)	10 ΜΩ
• 0 to 300 ohms	Yes
— Input resistance (0 to 300 ohms)	10 ΜΩ
0 to 600 ohms	Yes
- Input resistance (0 to 600 ohms)	10 ΜΩ
	No
• 0 to 6000 ohms	Yes
— Input resistance (0 to 6000 ohms)	10 ΜΩ
• PTC	Yes
— Input resistance (PTC)	10 ΜΩ
Thermocouple (TC)	
Temperature compensation	V
— parameterizable	Yes
— internal temperature compensation	Yes
— external temperature compensation via RTD	Yes
— Compensation for 0 °C reference point temperature	Yes; fixed value can be set
— Reference channel of the module	Yes
Cable length	900 m; for III 200 m for D/DTD 50 m for TO
• shielded, max.	800 m; for U/I, 200 m for R/RTD, 50 m for TC
Analog value generation for the inputs	
Integration and conversion time/resolution per channel	4011
Resolution with overrange (bit including sign), max.	16 bit
Integration time, parameterizable	Yes

Integration time (ms)	2,5 / 16,67 / 20 / 100 ms
 Basic conversion time, including integration time (ms) 	9 / 23 / 27 / 107 ms
 additional conversion time for wire-break monitoring 	9 ms (to be considered in R/RTD/TC measurement)
 additional conversion time for resistance measurement 	150 ohm, 300 ohm, 600 ohm, Pt100, Pt200, Ni100: 2 ms, 6000 ohm, Pt500, Pt1000, Ni1000, LG-Ni1000, PTC: 4 ms
 Interference voltage suppression for interference frequency f1 in Hz 	400 / 60 / 50 / 10 Hz
Time for offset calibration (per module)	Basic conversion time of the slowest channel
Smoothing of measured values	
 parameterizable 	Yes
Step: None	Yes
Step: low	Yes
Step: Medium	Yes
Step: High	Yes
Encoder	
Connection of signal encoders	
for voltage measurement	Yes
for current measurement as 2-wire transducer	Yes
— Burden of 2-wire transmitter, max.	820 Ω
for current measurement as 4-wire transducer for registeres measurement with two wire connections.	Yes
 for resistance measurement with two-wire connection for resistance measurement with three-wire connection 	Yes; Only for PTC Yes; All measuring ranges except PTC; internal compensation of the cable
	resistances
for resistance measurement with four-wire connection Expersions	Yes; All measuring ranges except PTC
Errors/accuracies	0.00 %
Linearity error (relative to input range), (+/-)	0.02 %
Temperature error (relative to input range), (+/-) Crosstalk between the inputs, max.	0.005 %/K; With TC type T 0.02 ± % / K -80 dB
Repeat accuracy in steady state at 25 °C (relative to input	0.02 %
range), (+/-)	±6 °C
Temperature error of internal compensation Operational error limit in overall temperature range	±0 C
Voltage, relative to input range, (+/-)	0.3 %
Current, relative to input range, (+/-)	0.3 %
Resistance, relative to input range, (+/-)	0.3 %
• Resistance thermometer, relative to input range, (+/-)	Ptxxx standard: ±1.5 K, Ptxxx climate: ±0.5 K, Nixxx standard: ±0.5 K, Nixxx climate: ±0.3 K
• Thermocouple, relative to input range, (+/-)	Type B: > 600 °C ±4.6 K, type E: > -200 °C ±1.5 K, type J: > -210 °C ±1.9 K, type K: > -200 °C ±2.4 K, type N: > -200 °C ±2.9 K, type R: > 0 °C ±4.7 K, type S: > 0 °C ±4.6 K, type T: > -200 °C ±2.4 K
Basic error limit (operational limit at 25 °C)	
 Voltage, relative to input range, (+/-) 	0.1 %
 Current, relative to input range, (+/-) 	0.1 %
 Resistance, relative to input range, (+/-) 	0.1 %
• Resistance thermometer, relative to input range, (+/-)	Ptxxx standard: ± 0.7 K, Ptxxx climate: ± 0.2 K, Nixxx standard: ± 0.3 K, Nixxx climate: ± 0.15 K
• Thermocouple, relative to input range, (+/-)	Type B: > 600 °C ±1.7 K, type E: > -200 °C ±0.7 K, type J: > -210 °C ±0.8 K, type K: > -200 °C ±1.2 K, type N: > -200 °C ±1.2 K, type R: > 0 °C ±1.9 K, type S: > 0 °C ±1.9 K, type T: > -200 °C ±0.8 K
Interference voltage suppression for f = n x (f1 +/- 1 %), f1 = interference	* **
Series mode interference (peak value of interference < rated value of input range), min.	40 dB
Common mode voltage, max.	10 V
Common mode interference, min.	60 dB
Interrupts/diagnostics/status information	
Diagnostics function	Yes
Alarms	
Diagnostic alarm	Yes
Limit value alarm	Yes; two upper and two lower limit values in each case
Diagnoses	
Monitoring the supply voltage	Yes
Wire-break Overflow/underflow	Yes; Only for 1 to 5 V, 4 to 20 mA, TC, R, and RTD
Overflow/underflow Diagnostics indication LED	Yes
Diagnostics indication LED	

• RUN LED	Yes; green LED
• ERROR LED	Yes; red LED
 Monitoring of the supply voltage (PWR-LED) 	Yes; green LED
Channel status display	Yes; green LED
 for channel diagnostics 	Yes; red LED
 for module diagnostics 	Yes; red LED
Potential separation	
Potential separation channels	
 between the channels 	No
 between the channels, in groups of 	8
 between the channels and backplane bus 	Yes
 between the channels and the power supply of the electronics 	Yes
Permissible potential difference	
between the inputs (UCM)	20 V DC
Between the inputs and MANA (UCM)	10 V DC
Isolation	
Isolation tested with	707 V DC (type test)
Standards, approvals, certificates	
Suitable for applications according to AMS 2750	Yes; Declaration of Conformity, see online support entry 109757262
Suitable for applications according to CQI-9	Yes; Based on AMS 2750 E
product functions / security / header	
signed firmware update	No
data integrity	No
Ambient conditions	
Ambient temperature during operation	
 horizontal installation, min. 	-25 °C; From FS08
 horizontal installation, max. 	60 °C
 vertical installation, min. 	-25 °C; From FS08
vertical installation, max.	40 °C
Altitude during operation relating to sea level	
 Installation altitude above sea level, max. 	5 000 m; Restrictions for installation altitudes > 2 000 m, see manual
Dimensions	
Width	35 mm
Height	147 mm
Depth	129 mm
Weights	
Weight, approx.	310 g
Other	
Note:	Additional basic error and noise for integration time = 2.5 ms: Voltage: ±250 mV (±0.02%), ±80 mV (±0.05%), ±50 mV (±0.05%); resistance: 150 ohms ±0.02%; resistance thermometer: Pt100 climate: ±0.08 K, Ni100 climate: ±0.08 K; thermocouple: Type B, R, S: ±3 K, type E, J, K, N, T: ±1 K

last modified:

4/25/2024

SIEMENS

Data sheet

6ES7531-7LH00-0AB0



SIMATIC S7-1500, analog input module AI 16xU BA, 16-bit resolution accuracy 0.5%, 16 channels in groups of 16, common mode voltage 4 V DC, diagnostics, hardware interrupts; delivery including infeed element, shield bracket and shield terminal: front connector (screw terminals or push-in) to be ordered separately

General information	
Product type designation	AI 16xU BA
HW functional status	From FS01
Firmware version	V1.0.0
FW update possible	Yes
Product function	
● I&M data	Yes; I&M0 to I&M3
 Isochronous mode 	No
 Prioritized startup 	No
 Measuring range scalable 	No
 Scalable measured values 	No
Adjustment of measuring range	No
Engineering with	
 STEP 7 TIA Portal configurable/integrated from version 	V16 with HSP 312 / V17
 STEP 7 configurable/integrated from version 	V5.5 SP3 / -
 PROFIBUS from GSD version/GSD revision 	V1.0 / V5.1
 PROFINET from GSD version/GSD revision 	V2.3 / -
Operating mode	
 Oversampling 	No
• MSI	Yes
CiR - Configuration in RUN	
Reparameterization possible in RUN	Yes
Calibration possible in RUN	No
Power	
Power available from the backplane bus	0.85 W
Power loss	
Power loss, typ.	0.75 W
Analog inputs	
Number of analog inputs	16
 For voltage measurement 	16
permissible input voltage for voltage input (destruction limit), max.	12 V; 12 V continuous, 30 V for max. 1 s
Input ranges (rated values), voltages	
• 0 to +5 V	No
• 0 to +10 V	No
• 1 V to 5 V	Yes
— Input resistance (1 V to 5 V)	10 ΜΩ
• -1 V to +1 V	Yes
— Input resistance (-1 V to +1 V)	10 ΜΩ
• -10 V to +10 V	Yes

Implicit resistance, (1.0 Vp + 10 V) 2.5 V V + 2.5 V V -	Inc. 1 and internal (40 VI)	40.140
. 25 m V to +25 m V . 25 V to +5 V . 1 mport resistance (5 V to +5 V) . 1 mport resistance (5 V to +5 V) . 1 mport resistance (5 V to +5 V) . 20 m V to +50 m V . 20 m V to +50 m V . 20 m V to +50 m V . 20 m V . 20 m V to +50 m V . 20 m	— Input resistance (-10 V to +10 V)	10 ΜΩ
Input resistance (8 V to +5 V)		
- 80 mV to +80 mV Cable length - 80 mV to +80 mV Cable length - 80 mV to +80 mV Cable length - 90 mV to +80 mV Measurement principle - Resolution with overrange (bit including sign), max Integration and conversion time/resolution per channel - Resolution with overrange (bit including sign), max Integration time, prasmeterizable - Resolution with overrange (bit including sign), max Integration time, prasmeterizable - Integration time, prasmeterizable - Integration time, prasmeterizable - Additional conversion time (ms) - Additional conversion time for wire-break monitoring - Interference voitage suppression for interference frequency fit in triz - Smoothing of measured values - Step: None -		
30 mV to -80 mV		
Cable length - Inledicd, max Anatory white generation for the inputs Measurement principle - Resolution with overrange (bit including sign), max. - Inlegration time, parameterizable - Resolution with overrange (bit including sign), max. - Inlegration time, parameterizable - Inlegration time, parameterizable - Selection with overrange (bit including integration time (ms) - Additional convention time for wire-break monitoring - Interference voitage suppression for interference frequency 1 in 12: - Smoothing of measured values - Series: Need time - Selection - Selection		
** whiteled, max **Maralory value generation for the imputs **Measurement principle integration and conversion time/resolution per channel **Resolution with overrange (bit including sign), max. **Integration time, parameterizable **Integration time, parameterizable **Integration time, including integration time (ms) **—additional conversion time for wise-break monitoring **Integration evoltage suppression for interference frequency f1 in Hz **Smoching of measured values **Parameterizable **Parameterizable **Parameterizable **Parameterizable **Sign: None **Sign: None **Sign: Medium **Sign: Medi		NO
Measurement principle integration of conversion time/resolution per channel integration and conversion time/resolution per channel integration and conversion time/resolution per channel integration with overrange (bit including syin), max. • Indegration time, parameterizable Yes • Indegration time, parameterizable Yes • Indegration time, provided integration time (ms) • Assist conversion time, including integration time (ms) • Assist conversion time, including integration time (ms) • Assist conversion time for wire-break monitoring • Interference voitage suppression for interference frequency if in It? Smoothing of measured values • Siep: None • Siep: None • Siep: None • Siep: None • Siep: Nedulum • Siep: Index • Siep: Hedulum • Siep: Index • Conversion of signal encoders • For voitage measurement * Yes • Connection of signal encoders • For voitage measurement * Yes * Constalk between the inputs, max. • Or voitage measurement * Yes * Crosstalk between the inputs, max. * Siep: Si		200 m
Integration and conversion time/resolution per channel		200 111
Integration and conversion time/resolution per channel Resolution with overarrage (bit including sign), max. Integration time, parameterzable Integration time (ms) Basic conversion time, including integration time (ms) Basic conversion time, including integration time (ms) Basic conversion time, including integration time (ms) Resulting oversion time, including integration time (ms) Interference vortage suppression for interference frequency of tin Hz Smoothing of measured values Step: None Or variage measurement Pes Connection of signal encoders For ovitage measurement Ves Connection of signal encoders For ovitage measurement Ves Providage measurement Pes Providage measurement Pes Providage measurement Pes Providage very cleative to input range), (+/-) Outside the step in		integrating
Resolution with overrange (bit including sign), max. Integration time, parameterizable Integration time, parameterizable Significant conversion time, including integration time (ms) Additional conversion time for wire-break monitoring Interference voltage suppression for interference frequency f1 in Hz Smoothing of measured values Parameterizable Significant Si		integrating
Integration time, parameterizable Yes Integration time (ms) 2,5 / 16,67 / 20 / 100 ms Basic conversion time, including integration time (ms) 4 ms (to be considered for 1 to 5 V measurement) Interference voltage suppression for interference frequency 1 in Hz Parameterizable Yes Step: Nome Yes Step: Nome Yes Step: Nome Yes Step: High Yes	•	16 bit
Integration time (ms)		
Basic conversion time, including integration time (ms)	•	
Interference voltage suppression for interference frequency 11 in Hz Smoothing of measured values parameterizable Step: None Step: None Step: Modum Step: Modum Step: High Procedure Step: High Procedure Step: Modum Step: High Procedure Step: Modum Step: Modum Step: High Procedure Step: Modum Step: High Procedure Step: High Procedure Step: Modum Step: High Procedure Step: High Step: Hig		
Interference voltage suppression for interference frequency 1 in 1z		
frequency f1 in Hz	-	
Smoothing of measured values parameterizable Yes Step: None Yes Step: None Yes Step: Jick Yes Step: Lipign Yes For voltage measurement Yes For voltage restore (relative to input range), (+/-) 0.006 %/K Crosstalk between the inputs, max. -50 dB Repeat accuracy in steady state at 25 °C (relative to input range), (+/-) 0.1 % Grappel, (+/-) Introversional temperature range -Voltage, relative to input range, (+/-) 0.5 % Sasic error limit (operational limit at 25 °C) Voltage, relative to input range, (+/-) 0.3 % Interference voltage suppression for f = n x (f1 */-1 %), f1 = interference frequency Series mode interference (peak value of interference < 40 d dB Alarms Alarms Alarms Alarms Diagnostic alarm Yes Limit value alarm Yes Limit value alarm Yes Diagnostic alarm Yes Limit value alarm Yes Common mode voltage, max Yes Common fight e supply voltage No No No Overdrowinderflow Yes Diagnostic indication LED Yes; green LED FRROR LED Yes; green LED		700 / 00 / 10 112
parameterizable step: None step:		
• Step: None • Step: Medium • Step: Hedium • Step: High • Frors/accuraciens Linearity error (relative to input range), (+/-) Crossatiak between the inputs, max. Repeat accuracy in steady state at 25 °C (relative to input range), (+/-) Operational error limit in overall temperature range • Voltage, relative to input range, (+/-) Basic error limit (operational limit at 25 °C) • Voltage, relative to input range, (+/-) Series mode interference (peak value of interference requency • Series mode interference, enin. • Common mode voltage, max. • Limit value alarm • Diagnostics function Alarms • Diagnostic status information Diagnoses • Monitoring the supply voltage • Wire-break • Short-circuit • Overmon winder • Common winder • Common winder • Limit value alarm • Yes • Limit value alarm • Yes • Chim value alarm • Yes • Limit value alarm • Yes • Chim value alarm • Yes • Short-circuit • No • Overflow/underflow • Yes • Short-circuit • RNOR LED • Cerosor LED • RNOR LED • ERROR LED • ERROR LED • ERROR LED • MAINT LED		Yes
Step: Idealium Step: Medium Step: Medium Step: Medium Step: High Step: High Pes Encodor Connection of signal encoders of or voltage measurement Foros/accuracies Linearity error (relative to input range), (+/-) Interrity error (relative to input range), (+/-) O.006 %/K Crosstalk between the inputs, max Separat accuracy in steady state at 25 °C (relative to input range), (+/-) O.5 % Repeat accuracy in steady state at 25 °C (relative to input range) O-perational error limit in overall temperature range Voltage, relative to input range, (+/-) O.5 % Basic error limit (operational limit at 25 °C) Voltage, relative to input range, (+/-) O.3 % Interference voltage suppression for f = n x (f1 +/- 1 %), f1 = interference frequency Series mode interference (peak value of interference < rated value of input range), min. Common mode voltage, max Common mode voltage, max Voltage, max Diagnostics function Yes Alarms Diagnostics function Yes Monitoring the supply voltage No Monitoring the supply voltage No Monitoring the supply voltage No O-veriflow underflow Yes; two upper and two lower limit values in each case Diagnoses Monitoring the supply voltage No O-veriflow underflow Yes Course of LED Yes; green LED FerROR LED FerROR LED Ves; red LED MAINT LED No	•	Yes
Step: High Pes Step:	Step: low	Yes
Step: High Finceder Connection of signal encoders • for voltage measurement Persons accuracies Linearity error (relative to input range), (+/-) Crosstalk between the inputs, max. -50 dB Repeat accuracy in steady state at 25 °C (relative to input range), (+/-) Operational error limit in overall temperature range • Voltage, relative to input range, (+/-) Operational error limit in overall temperature range • Voltage, relative to input range, (+/-) 0.5 % Basic error limit (operational limit at 25 °C) • Voltage, relative to input range, (+/-) 0.3 % Interference voltage suppression for f = n x (ft +/- 18), ft = interference frequency • Series mode interference (peak value of interference < rated value of input range), min. • Common mode voltage, max. • Common mode voltage, max. • Common mode voltage, max. • Common mode interference, min. 60 dB Interrupts/diagnostics/status information Diagnostics function Alarms • Diagnostic alarm • Diagnostic alarm • Limit value alarm Yes • Monitoring the supply voltage • Wire-break • Wore-break • Wore-break • Yes; Only for 1 5 V No • Overflow/underflow Yes Diagnostics indication LED • RINN LED • RINN LED • Yes; green LED • ERROR LED • MAINT LED	•	Yes
Encoder Connection of signal encoders • for voltage measurement Errors/accuracies Linearity error (relative to input range), (+/-) Crosstalk between the inputs, max. Repeat accuracy in steady state at 25 °C (relative to input range), (+/-) Out was accuracy in steady state at 25 °C (relative to input range), (+/-) Outside, relative to input range, (+/-) Basic error limit in overall temperature range • Voltage, relative to input range, (+/-) Outside, relative to input range,	·	
or voltage measurement Firors/accuracies Linearity error (relative to input range), (+/-) Temperature error (relative to input range), (+/-) Crosstalk between the inputs, max. -50 dB Repeat accuracy in steady state at 25 °C (relative to input range), (+/-) Operational error limit in overall temperature range • Voltage, relative to input range, (+/-) Basic error limit (operational limit at 25 °C) • Voltage, relative to input range, (+/-) O.3 % Interference voltage suppression for f = n x (11 +/- 1 %), 11 = interference frequency • Series mode interference (peak value of interference < rated value of input range), min. • Common mode voltage, max. • Diagnostics function Pres Alarms • Diagnostics function Ves Unit value alarm Yes • Monitoring the supply voltage • Monitoring the suppl		
Firos/Accuracies Linearity error (relative to input range), (+/-) Crosstalk between the inputs, max. -50 dB Repeat accuracy in steady state at 25 °C (relative to input range), (+/-) Operational error limit in overall temperature range • Voltage, relative to input range, (+/-) Basic error limit (operational limit at 25 °C) • Voltage, relative to input range, (+/-) Series mode interference (pask value of interference < rated value of input range), min. • Common mode voltage, max. • Common mode voltage, max. • Common mode interference, min. 10 lagnostics function Alarms • Diagnostic slarm • Limit value alarm Pes • Monitoring the supply voltage • Wire-break • Wire-break • Wore-break • Sort-circuit • Group error • Overflow/underflow Pes; green LED • ERROR LED • MAINT LED		
Errors/accuracies Linearity error (relative to input range), (+/-) Temperature error (relative to input range), (+/-) Crosstalk between the inputs, max. Repeat accuracy in steady state at 25 °C (relative to input range), (+/-) Operational error limit in overall temperature range Voltage, relative to input range, (+/-) Basic error limit (operational limit at 25 °C) Voltage, relative to input range, (+/-) Basic error limit (operational limit at 25 °C) Voltage, relative to input range, (+/-) Basic error limit (operational limit at 25 °C) Voltage, relative to input range, (+/-) Interference voltage suppression for f = n x (f1 +/- 1 %), f1 = interference frequency Series mode interference (peak value of interference < rad of dB common mode voltage, max. Vommon mode voltage, max. Vommon mode voltage, max. Vommon mode interference, min. Diagnostics function Pagnostics function Alarms Diagnostic alarm Ves Limit value alarm Yes Monitoring the supply voltage Monitoring the supply voltage Monitoring the supply voltage Virre-break Short-circuit No Overflow/underflow Pass Diagnostics indication LED RUN LED Pess ROR LED SERROR LED SERROR LED SERROR LED SERROR LED MAINT LED No	•	Yes
Linearity error (relative to input range), (+/-) Temperature error (relative to input range), (+/-) Crosstalk between the inputs, max. -50 dB Repeat accuracy in steady state at 25 °C (relative to input range), (+/-) Operational error limit in overall temperature range • Voltage, relative to input range, (+/-) Sasic error limit (operational limit at 25 °C) • Voltage, relative to input range, (+/-) O.5 % Sasic error limit (operational limit at 25 °C) • Voltage, relative to input range, (+/-) O.3 % Interference voltage suppression for f = n x (f1 +/- 1 %), f1 = interference frequency • Series mode interference (peak value of interference < 40 dB rated value of input range), min. • Common mode voltage, max. • Common mode voltage, max. • Common mode interference, min. Diagnostics function Pes Alarms • Diagnostics function Ves Alarms • Diagnostic alarm • Ves • Monitoring the supply voltage • Wire-break • Wire-break • Wes; Only for 1 5 V No • Overflow/underflow Pos; green LED • ERROR LED • ERROR LED • ERROR LED • MAINT LED	·	
Temperature error (relative to input range), (+/-) Crosstalk between the inputs, max. -50 dB Repeat accuracy in steady state at 25 °C (relative to input range), (+/-) Operational error limit in overall temperature range • Voltage, relative to input range, (+/-) Basic error limit (operational limit at 25 °C) • Voltage, relative to input range, (+/-) Series mode interference (peak value of interference frequency • Series mode interference (peak value of interference < rated value of input range), min. • Common mode voltage, max. • Common mode voltage, max. • Common mode interference, min. Diagnostics function Alarms • Diagnostics function Ves • Limit value alarm Yes • Limit value alarm Yes; two upper and two lower limit values in each case Diagnoses • Monitoring the supply voltage • Wire-break • Short-circuit No • Overflow/underflow Pes Page ne LED • RUN LED • RUN LED • REROR LED • MAINT LED		0.1 %
Crosstalk between the inputs, max. Repeat accuracy in steady state at 25 °C (relative to input range), (+/-) Operational error limit in overall temperature range • Voltage, relative to input range, (+/-) Basic error limit (operational limit at 25 °C) • Voltage, relative to input range, (+/-) 0.3 % Interference voltage suppression for f = n x (ft +/- 1 %), f1 = interference frequency • Series mode interference (peak value of interference < rated value of input range), min. • Common mode voltage, max. • Common mode interference, min. • Ood dB Interrupts/diagnostics/status information Diagnostics function Alarms • Diagnostics alarm • Limit value alarm Yes • Monitoring the supply voltage • Short-circuit No • Group error • Overflow/underflow Pies Diagnostics idication LED • RUN LED • ERROR LED • RUN LED • REROR LED • MAINT LED No		
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Basic error limit (operational limit at 25 °C) • Voltage, relative to input range, (+/-) Interference voltage suppression for f = n x (f1 +/- 1 %), f1 = interference frequency • Series mode interference (peak value of interference < rarded value of input range), min. • Common mode voltage, max. • Common mode voltage, max. • Common mode interference, min. 60 dB Interrupts/diagnostics/status information Diagnostics function Yes • Diagnostic alarm • Diagnostic alarm • Unit value alarm Yes; two upper and two lower limit values in each case Diagnoses • Monitoring the supply voltage • Monitoring the supply voltage • Wire-break • Short-circuit • Short-circuit • Overflow/underflow Pes Diagnostics indication LED • RUN LED • RUN LED • RUN LED • RROR LED • MAINT LED	Operational error limit in overall temperature range	
Voltage, relative to input range, (+/-) Interference voltage suppression for f = n x (f1 +/- 1 %), f1 = interference frequency Series mode interference (peak value of interference < 40 dB rated value of input range), min. Common mode voltage, max. Common mode interference, min. Diagnostics function Pes Diagnostics function Alarms Diagnostic alarm Limit value alarm Ves Monitoring the supply voltage Wire-break Short-circuit Group error Overflow/underflow Pes; green LED Pes; green LED Pes; red LED MAINT LED Maint Interference frequency 40 dB Ad B Ad B Alarms 4 V Ves 40 dB No No 4 V Ves 40 dB No No No Fo de B No No No Ves No No No No Ves Pes; Only for 1 5 V No No No No No No No No No N	 Voltage, relative to input range, (+/-) 	0.5 %
Interference voltage suppression for f = n x (f1 +/- 1 %), f1 = interference frequency • Series mode interference (peak value of interference < 40 dB **Common mode voltage, max.** • Common mode interference, min.** • Diagnostics function	Basic error limit (operational limit at 25 °C)	
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rated value of input range), min. • Common mode voltage, max. • Common mode interference, min. 60 dB Interrupts/diagnostics/status information Diagnostics function Alarms • Diagnostic alarm • Diagnostic alarm • Limit value alarm Pes; two upper and two lower limit values in each case Diagnoses • Monitoring the supply voltage • Wire-break • Short-circuit • Group error • Overflow/underflow Diagnostics indication LED • RUN LED • ERROR LED • MAINT LED • MAINT LED • MAINT LED	Interference voltage suppression for f = n x (f1 +/- 1 %), f1 = interference	erence frequency
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Common mode interference, min. Interrupts/diagnostics/status information Diagnostics function Pes Alarms Diagnostic alarm Limit value alarm Pes; two upper and two lower limit values in each case Diagnoses Monitoring the supply voltage Wire-break Short-circuit Short-circuit Group error Overflow/underflow Pes Diagnostics indication LED RUN LED ERROR LED MAINT LED MAINT LED MAINT LED		404
Interrupts/diagnostics/status information Diagnostics function Alarms • Diagnostic alarm • Limit value alarm Yes; two upper and two lower limit values in each case Diagnoses • Monitoring the supply voltage • Wire-break • Short-circuit • Group error • Overflow/underflow Diagnostics indication LED • RUN LED • ERROR LED • MAINT LED Yes Yes Yes Yes Yes Yes Yes Ye	3 .	
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 Diagnostic alarm Limit value alarm Yes; two upper and two lower limit values in each case Diagnoses Monitoring the supply voltage Wire-break Wire-break Short-circuit Group error Overflow/underflow Diagnostics indication LED RUN LED ERROR LED MAINT LED Yes; two upper and two lower limit values in each case No Yes; Only for 1 5 V No Yes; only for 1 5 V No Yes; green LED Yes; red LED MAINT LED No		Yes
Limit value alarm Yes; two upper and two lower limit values in each case Diagnoses Monitoring the supply voltage Wire-break Yes; Only for 1 5 V Short-circuit No Group error No Overflow/underflow PUN LED RUN LED ERROR LED MAINT LED No Yes; two upper and two lower limit values in each case No Yes; Only for 1 5 V Yes; Only for 1 5 V No		
Diagnoses • Monitoring the supply voltage • Wire-break • Short-circuit • Group error • Overflow/underflow Diagnostics indication LED • RUN LED • ERROR LED • MAINT LED • MAINT LED		
Monitoring the supply voltage Wire-break Short-circuit Group error Overflow/underflow Pagnostics indication LED RUN LED ERROR LED MAINT LED No No Yes; Only for 1 5 V No Yes; Only for 1 5 V No Yes; Only for 1 5 V No No No No No No No No No N		Yes; two upper and two lower limit values in each case
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 Short-circuit Group error Overflow/underflow Piagnostics indication LED RUN LED ERROR LED MAINT LED No 		
Group error Overflow/underflow Overflow/underflow Diagnostics indication LED RUN LED Yes; green LED ERROR LED Yes; red LED MAINT LED		
Overflow/underflow Diagnostics indication LED RUN LED Yes; green LED ERROR LED MAINT LED No		
Diagnostics indication LED • RUN LED • ERROR LED • MAINT LED No	·	
• RUN LED Yes; green LED • ERROR LED Yes; red LED • MAINT LED No		Yes
 ERROR LED MAINT LED Yes; red LED No 	-	
• MAINT LED No	• RUN LED	Yes; green LED
	• ERROR LED	Yes; red LED
Monitoring of the supply voltage (PWR-LED) No	• MAINT LED	No
	 Monitoring of the supply voltage (PWR-LED) 	No

Channel status display	Yes; green LED
for channel diagnostics	Yes: red LED
for module diagnostics	Yes; red LED
Potential separation	res, reu LED
Potential separation channels	
between the channels	No
between the channels, in groups of	16
between the channels and backplane bus	Yes
Permissible potential difference	
between the inputs (UCM)	8 V DC
Between the inputs and MANA (UCM)	4 V DC
Isolation	
Isolation tested with	707 V DC (type test)
product functions / security / header	
signed firmware update	No
data integrity	No
Ambient conditions	
Ambient temperature during operation	
 horizontal installation, min. 	-30 °C
 horizontal installation, max. 	60 °C
 vertical installation, min. 	-30 °C
 vertical installation, max. 	40 °C
Altitude during operation relating to sea level	
 Installation altitude above sea level, max. 	5 000 m; Restrictions for installation altitudes > 2 000 m, see manual
Dimensions	
Width	35 mm
Height	147 mm
Depth	129 mm
Weights	
Weight, approx.	250 g

Data sheet

6ES7531-7MH00-0AB0



SIMATIC S7-1500, analog input module AI 16xI BA, 16-bit resolution accuracy 0.5%, 16 channels in groups of 16, common mode voltage 4 V DC, diagnostics, hardware interrupts; delivery including infeed element, shield bracket and shield terminal: front connector (screw terminals or push-in) to be ordered separately

General information	
Product type designation	AI 16xI BA
HW functional status	From FS01
Firmware version	V1.0.0
FW update possible	Yes
Product function	
 I&M data 	Yes; I&M0 to I&M3
 Isochronous mode 	No
 Prioritized startup 	No
 Measuring range scalable 	No
 Scalable measured values 	No
 Adjustment of measuring range 	No
Engineering with	
 STEP 7 TIA Portal configurable/integrated from version 	V16 with HSP 312 / V17
 STEP 7 configurable/integrated from version 	V5.5 SP3 / -
 PROFIBUS from GSD version/GSD revision 	V1.0 / V5.1
 PROFINET from GSD version/GSD revision 	V2.3 / -
Operating mode	
 Oversampling 	No
• MSI	Yes
CiR - Configuration in RUN	
Reparameterization possible in RUN	Yes
Calibration possible in RUN	No
Power	
Power available from the backplane bus	0.85 W
Power loss	
Power loss, typ.	1.2 W
Analog inputs	
Number of analog inputs	16
 For current measurement 	16
permissible input current for current input (destruction limit), max.	40 mA
Input ranges (rated values), currents	
• 0 to 20 mA	Yes
— Input resistance (0 to 20 mA)	25 Ω ; Plus approx. 42 ohms for overvoltage protection by PTC
• -20 mA to +20 mA	Yes
— Input resistance (-20 mA to +20 mA)	25 Ω ; Plus approx. 42 ohms for overvoltage protection by PTC
• 4 mA to 20 mA	Yes
— Input resistance (4 mA to 20 mA)	25 Ω ; Plus approx. 42 ohms for overvoltage protection by PTC
Cable length	

• shielded, max.	800 m
Analog value generation for the inputs	
Measurement principle	integrating
Integration and conversion time/resolution per channel	inograting
Resolution with overrange (bit including sign), max.	16 bit
Integration time, parameterizable	Yes
Integration time (ms)	2,5 / 16,67 / 20 / 100 ms
Basic conversion time, including integration time (ms)	10 / 24 / 27 / 107 ms
Interference voltage suppression for interference frequency f1 in Hz	400 / 60 / 50 / 10 Hz
Smoothing of measured values	
parameterizable	Yes
Step: None	Yes
Step: low	Yes
Step: Medium	Yes
Step: High	Yes
Encoder	
Connection of signal encoders	
for voltage measurement	No
• for current measurement as 2-wire transducer	Yes; with external supply
• for current measurement as 4-wire transducer	Yes
• for resistance measurement with two-wire connection	No
• for resistance measurement with three-wire connection	No
• for resistance measurement with four-wire connection	No
Errors/accuracies	
Linearity error (relative to input range), (+/-)	0.1 %
Temperature error (relative to input range), (+/-)	0.006 %/K
Crosstalk between the inputs, max.	-50 dB
Repeat accuracy in steady state at 25 $^{\circ}\text{C}$ (relative to input range), (+/-)	0.1 %
Operational error limit in overall temperature range	
 Current, relative to input range, (+/-) 	0.5 %
Basic error limit (operational limit at 25 °C)	
Current, relative to input range, (+/-)	0.3 %
Interference voltage suppression for f = n x (f1 +/- 1 %), f1 = interference	
 Series mode interference (peak value of interference < rated value of input range), min. 	40 dB
Common mode voltage, max.	4 V
Common mode interference, min.	60 dB
Interrupts/diagnostics/status information	
Diagnostics function	Yes
Alarms	V
Diagnostic alarm	Yes
Limit value alarm	Yes; two upper and two lower limit values in each case
Diagnoses	No
Monitoring the supply voltage Nire break	No
Wire-break Chart circuit	Yes; Only for 4 20 mA
Short-circuit	No No
Group error Overflow/underflow	No
Overflow/underflow Diagnostics indication LED.	Yes
Diagnostics indication LED	Voc. groon LED
• RUN LED	Yes; green LED
• ERROR LED	Yes; red LED
MAINT LED Magitaring of the cumple weltage (DWD LED)	No No
Monitoring of the supply voltage (PWR-LED)	No
Channel status display	Yes; green LED
• for channel diagnostics	Yes; red LED
for module diagnostics	Yes; red LED
Potential separation	
Potential separation channels	
 between the channels 	No

16
Yes
8 V DC
4 V DC
707 V DC (type test)
No
No
-30 °C
60 °C
-30 °C
40 °C
5 000 m; Restrictions for installation altitudes > 2 000 m, see manual
35 mm
147 mm
129 mm
250 g

Data sheet 6ES7531-7NF00-0AB0



SIMATIC S7-1500 analog input module AI 8xU/I HF, up to 24 bit resolution, accuracy 0.1%, 8 channels in groups of 1; common mode voltage: 30 V AC/60 V DC, Diagnostics; Hardware interrupts Measured values scalable, measuring range adjustment, Calibrate in RUN; Delivery including infeed element, shield bracket and shield terminal: Front connector (screw terminals or push-in) to be ordered separately

General information	
Product type designation	AI 8xU/I HF
HW functional status	From FS01
Firmware version	V1.1.0
FW update possible	Yes
Product function	
● I&M data	Yes; I&M0 to I&M3
 Isochronous mode 	No
Prioritized startup	Yes
Measuring range scalable	No
 Scalable measured values 	Yes
 Adjustment of measuring range 	Yes
Engineering with	
 STEP 7 TIA Portal configurable/integrated from version 	V14 / -
 STEP 7 configurable/integrated from version 	V5.5 SP3 / -
 PROFIBUS from GSD version/GSD revision 	V1.0 / V5.1
 PROFINET from GSD version/GSD revision 	V2.3 / -
Operating mode	
 Oversampling 	No
• MSI	Yes
CiR - Configuration in RUN	
Reparameterization possible in RUN	Yes
Calibration possible in RUN	Yes
Supply voltage	
Rated value (DC)	24 V
permissible range, lower limit (DC)	19.2 V
permissible range, upper limit (DC)	28.8 V
Reverse polarity protection	Yes
Input current	
Current consumption, max.	50 mA; with 24 V DC supply
Power	
Power available from the backplane bus	0.85 W
Power loss	
Power loss, typ.	1.9 W
Analog inputs	
Number of analog inputs	8
 For current measurement 	8
For voltage measurement	8
permissible input voltage for voltage input (destruction limit), max.	28.8 V

permissible input current for current input (destruction limit),	40 mA
max. Input ranges (rated values), voltages	
• 0 to +5 V	No
• 0 to +10 V	No
• 1 V to 5 V	Yes
— Input resistance (1 V to 5 V)	100 kΩ
• -10 V to +10 V	Yes
— Input resistance (-10 V to +10 V)	100 kΩ
• -2.5 V to +2.5 V	Yes
— Input resistance (-2.5 V to +2.5 V)	100 kΩ
• -25 mV to +25 mV	No
• -250 mV to +250 mV	No
• -5 V to +5 V	Yes
— Input resistance (-5 V to +5 V)	100 kΩ
• -50 mV to +50 mV	No
• -500 mV to +500 mV	No
● -80 mV to +80 mV	No
Input ranges (rated values), currents	
• 0 to 20 mA	Yes
— Input resistance (0 to 20 mA)	25 Ω ; Plus approx. 42 ohms for overvoltage protection by PTC
• -20 mA to +20 mA	Yes
— Input resistance (-20 mA to +20 mA)	25 Ω ; Plus approx. 42 ohms for overvoltage protection by PTC
• 4 mA to 20 mA	Yes
— Input resistance (4 mA to 20 mA)	25 Ω ; Plus approx. 42 ohms for overvoltage protection by PTC
Input ranges (rated values), thermocouples	
• Type B	No
• Type C	No
• Type E	No
• Type J	No
• Type K	No
• Type L	No
• Type N	No
• Type R	No
Type S	No
• Type T	No
Type TXK/TXK(L) to GOST	No
Input ranges (rated values), resistance thermometer	
• Cu 10	No
Cu 10 according to GOST	No
• Cu 50	No
Cu 50 according to GOST	No
• Cu 100	No
Cu 100 Cu 100 according to GOST	No
• Ni 10	No
Ni 10 Ni 10 according to GOST	No
Ni 100 Ni 100 Ni 100	No
	No
Ni 100 according to GOSTNi 1000	
	No No
Ni 1000 according to GOST L C Ni 1000	No No
• LG-Ni 1000	No No
Ni 120	No
Ni 120 according to GOST	No
• Ni 200	No
Ni 200 according to GOST	No
• Ni 500	No
 Ni 500 according to GOST 	No
● Pt 10	No
 Pt 10 according to GOST 	No
• Pt 50	No
 Pt 50 according to GOST 	No

• Pt 100	No
 Pt 100 according to GOST 	No
● Pt 1000	No
 Pt 1000 according to GOST 	No
• Pt 200	No
 Pt 200 according to GOST 	No
• Pt 500	No
 Pt 500 according to GOST 	No
Input ranges (rated values), resistors	
• 0 to 150 ohms	No
• 0 to 300 ohms	No
• 0 to 600 ohms	No
• 0 to 3000 ohms	No
• 0 to 6000 ohms	No
• PTC	No
Cable length	
shielded, max.	800 m
Analog value generation for the inputs	300 III
Integration and conversion time/resolution per channel	
Resolution with overrange (bit including sign), max.	24 bit: When using the function "Scaling of the measured values" or "Measuring
• Resolution with overlange (bit including sign), max.	24 bit; When using the function "Scaling of the measured values" or "Measuring range adaptation" (32 bit REAL format); 16 bit when using the S7 format (16 bit INTEGER)
• Integration time, parameterizable	Yes
• Integration time (ms)	Fast mode: 2.5 / 16.67 / 20 / 100 ms, standard mode: 7.5 / 50 / 60 / 300 ms
Basic conversion time, including integration time (ms)	Fast mode: 4 / 18 / 22 / 102 ms; Standard mode: 9 / 52 / 62 / 302 ms
Interference voltage suppression for interference frequency f1 in Hz	400 / 60 / 50 / 10 Hz
Basic execution time of the module (all channels released)	Corresponds to the channel with the highest basic conversion time
Smoothing of measured values	
parameterizable	Yes
Step: None	Yes
Step: low	Yes
Step: Medium	Yes
Step: High	Yes
Encoder	
Connection of signal encoders	
for voltage measurement	Yes
for current measurement as 2-wire transducer	Yes; with external transmitter supply
for current measurement as 4-wire transducer	Yes
for resistance measurement with two-wire connection	No
for resistance measurement with three-wire connection	No
for resistance measurement with four-wire connection for resistance measurement with four-wire connection	No
	INU
Errors/accuracies	0.02.0/
Linearity error (relative to input range), (+/-)	0.02 %
Temperature error (relative to input range), (+/-)	0.005 %/K
Crosstalk between the inputs, max.	-80 dB
Repeat accuracy in steady state at 25 °C (relative to input range), (+/-)	0.02 %
note regarding accuracy	at temperatures below 0 °C, the figures for operating error and temperature error are doubled
Operational error limit in overall temperature range	
 Voltage, relative to input range, (+/-) 	0.1 %
Current, relative to input range, (+/-)	0.1 %
Basic error limit (operational limit at 25 °C)	
 Voltage, relative to input range, (+/-) 	0.05 %
• Current, relative to input range, (+/-)	0.05 %
Interference voltage suppression for f = n x (f1 +/- 1 %), f1 = interfe	rence frequency
 Series mode interference (peak value of interference < rated value of input range), min. 	80 dB; in the Standard operating mode, 40 dB in the Fast operating mode
 Common mode voltage, max. 	60 V DC/30 V AC
Common mode interference, min.	80 dB

Interrupts/diagnostics/status information	
Diagnostics function	Yes
Alarms	
Diagnostic alarm	Yes
Limit value alarm	Yes; two upper and two lower limit values in each case
Diagnoses	
 Monitoring the supply voltage 	Yes
Wire-break	Yes; only for 1 5 V and 4 20 mA
Overflow/underflow	Yes
Diagnostics indication LED	
• RUN LED	Yes; green LED
• ERROR LED	Yes; red LED
 Monitoring of the supply voltage (PWR-LED) 	Yes; green LED
Channel status display	Yes; green LED
 for channel diagnostics 	Yes; red LED
for module diagnostics	Yes; red LED
Potential separation	
Potential separation channels	
 between the channels 	Yes
 between the channels, in groups of 	1
 between the channels and backplane bus 	Yes
 between the channels and the power supply of the electronics 	Yes
Permissible potential difference	
between different circuits	60 V DC/30 V AC; insulation rated for 120 V AC basic insulation: between the channels and the supply voltage L+; between the channels and the backplane bus; between the channels
Isolation	
Isolation tested with	2 000 V DC between the channels and the supply voltage L+; 2 000 V DC between the channels and the backplane bus; 2 000 V DC between the channels; 707 V DC (type test) between the supply voltage L+ and the backplane bus
product functions / security / header	
signed firmware update	No
data integrity	No
Ambient conditions	
Ambient temperature during operation	
• horizontal installation, min.	-30 °C; From FS02
 horizontal installation, max. 	60 °C
• vertical installation, min.	-30 °C; From FS02
• vertical installation, max.	40 °C
Dimensions	
Width	35 mm
Height	147 mm
Depth	100
	129 mm
Weights	129 mm

SIEMENS

Data sheet

6ES7531-7NF10-0AB0



SIMATIC S7-1500 Analog input module AI 8xU/I HS, 16 bit resolution, Accuracy 0.3% 8 channels in groups of 8; Common mode voltage 10 V; Diagnostics; Hardware interrupts 8 channels in 0.0625 ms Oversampling; Delivery including infeed element, shield bracket and shield terminal: Front connector (screw terminals or push-in) to be ordered separately

Figure similar

Product type designation	General information	
HW functional status		AI 8xI I/I HS
Firmware version Firmwa	• • •	
FRO update possible Yes Product function I I I I I I I I I I I I I I I I I I I		
Product function I &M data Yes; I&M0 to I&M3 I slockhronous mode Yes Prioritized startup Yes Measuring range scalable No Scalable measured values No Adjustment of measuring range No Engineering with STEP 7 TIA Portal configurable/integrated from version STEP 7 To configurable/integrated from version PROFIBUS from GSD version/GSD revision PROFIBUS from GSD version/GSD revision PROFIBUS from GSD version/GSD revision PROFINET from GSD version/GSD revision Personal from CSD version/GSD revision Personal from CSD version/GSD revision Profit from V14 / - Profit fro		
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Isochronous mode Prioritized startup Measuring range scalable Adjustment of measuring range No Adjustment of measuring range No Engineering with STEP 7 TIA Portal configurable/integrated from version STEP 7 configurable/integrated from version PROFIBUS from GSD version/GSD revision V1.0 / V5.1 V5.5 SP3 /- V5.4 /- V6.5 SP3 /- V6.5		Yes: I&M0 to I&M3
Prioritized startup Measuring range scalable Scalable measured values Scalable measured values No Scalable measured values No Adjustment of measuring range No Engineering with STEP 7 TIA Portal configurable/integrated from version STEP 7 Touritigurable/integrated from version STEP 7 Touritigurable/integrated from version PROFIBUS from GSD version/GSD revision V1.0 / V5.1 PROFIBUS from GSD version/GSD revision V2.3 /- Operating mode Oversampling MSI Yes CIR - Configuration in RUN Reparameterization possible in RUN Pes Scalibration possible in RUN Pes Scalibration possible in RUN Pes Scalibration possible in RUN Pes Scaled value (DC) Permissible range, lower limit (DC) Permissible range, lower limit (DC) Permissible range, upper limit (DC) Permissible range, upper limit (DC) Permissible range, upper limit (DC) Pes Scalable Max Vers Current consumption, max Percent Current consumption, max Power versulable from the backplane bus Power available from the backplane bus Power loss, typ. 3.4 W		
Measuring range scalable Scalable measured values Adjustment of measuring range Engineering with STEP 7 TIA Portal configurable/integrated from version STEP 7 To Portal configurable/integrated from version STEP 7 to Configurable/integrated from version PROFIBUS from GSD version/GSD revision PROFIBUS from GSD version/GSD version/GSD revision PROFIBUS from GSD version/GSD revision PROFIBUS from GSD version/GSD revision PROFIBUS from GSD version/GSD version PROFIBUS from GSD version/GSD vers		
• Scalable measured values • Adjustment of measuring range Engineering with • STEP 7 TIA Portal configurable/integrated from version • STEP 7 tonfigurable/integrated from version • STEP 7 configurable/integrated from version • STEP 7 configurable/integrated from version • STEP 7 configurable/integrated from version • PROFIBUS from GSD version/GSD revision • PROFIBUS from GSD version/GSD revision • PROFINET from GSD version/GSD revision • V2.3 /- Operating mode • Oversampling • MSI • Ves CIR - Configuration in RUN Reparameterization possible in RUN Reparameterization possible in RUN Yes Culibration possible in RUN Yes Supply voltage Rated value (DC) 24 V permissible range, lower limit (DC) 28.8 V Reverse polarity protection Yes Input current Current consumption, max. 240 mA; with 24 V DC supply • Short-circuit protection • Yes • Output current, max. Power Power variable from the backplane bus Power loss, typ. 3.4 W	·	
• Adjustment of measuring range Engineering with • STEP 7 TIA Portal configurable/integrated from version • STEP 7 configurable/integrated from version • STEP 7 configurable/integrated from version • PROFIBUS from GSD version/GSD revision • PROFIBUS from GSD version/GSD revision • PROFINET from GSD version/GSD revision • Oversampling • MSI • Oversampling • MSI • Yes CIR - Configuration in RUN Reparameterization possible in RUN Reparameterization possible in RUN Yes Calibration possible in RUN Yes Supply voltage Rated value (DC) permissible range, lower limit (DC) permissible range, upper limit (DC) permissible range, upper limit (DC) Reverse polarity protection Yes Input current Current consumption, max. Encoder supply 24 V encoder supply 24 V encoder supply • Short-circuit protection Yes • Output current, max. 20 mA; Max. 47 mA per channel for a duration < 10 s Power Vere ross, typ. Power loss, typ. 3.4 W	5 5	
Engineering with STEP 7 TIA Portal configurable/integrated from version STEP 7 configurable/integrated from version PROFIBUS from GSD version/GSD revision PROFIBUS from GSD version/GSD revision PROFIBUT from GSD version/GSD revision Operating mode Oversampling MSI Ves CIR - Configuration in RUN Reparameterization possible in RUN Calibration possible in RUN Yes Calibration possible in RUN Supply voltage Rated value (DC) Permissible range, lower limit (DC) Permissible range, upper limit (DC) Permissible range, upper limit (DC) Permissible range, where limit		
STEP 7 TIA Portal configurable/integrated from version STEP 7 configurable/integrated from version PROFIBUS from GSD version/GSD revision PROFIBUS from GSD version/GSD revision PROFIBUS from GSD version/GSD revision V2.3 /- Operating mode Oversampling MSI STEP 7 configuration in RUN Reparameterization possible in RUN Pes Calibration possible in RUN Yes Calibration possible in RUN Yes Supply voltage Rated value (DC) Permissible range, lower limit (DC) Permissible range, upper limit (DC) Permissible range, upper limit (DC) Permissible range, with the voltage in RUN Reverse polarity protection Yes Input current Current consumption, max. 240 mA; with 24 V DC supply 4 V encoder supply Short-circuit protection Yes Output current, max. 20 mA; Max. 47 mA per channel for a duration < 10 s Power available from the backplane bus Power loss, typ. 3.4 W		
STEP 7 configurable/integrated from version PROFIBUS from GSD version/GSD revision PROFIBUS from GSD version/GSD revision V1.0 / V5.1 PROFINET from GSD version/GSD revision V2.3 /- Operating mode Oversampling MSI Pes MSI Pes CIR - Configuration in RUN Reparameterization possible in RUN Pes Calibration possible in RUN Yes Supply voltage Rated value (DC) Permissible range, lower limit (DC) Permissible range, upper limit (DC) Pess Input current Current consumption, max. Power supply 24 V encoder supply Short-circuit protection Output current, max. Power Power available from the backplane bus 1.15 W Power loss Power loss, typ. 3.4 W	• •	V14 / -
PROFIBUS from GSD version/GSD revision PROFINET from GSD version/GSD revision V2.3 /- Operating mode Oversampling MSI MSI Yes CIR - Configuration in RUN Reparameterization possible in RUN Yes Calibration possible in RUN Yes Supply voltage Rated value (DC) Permissible range, lower limit (DC) Permissible range, upper limit (DC) Permit consumption, max Power evaluable from the backplane bus Power available from the backplane bus Power loss Power loss, typ. 3.4 W		V5.5 SP3 / -
Operating mode Oversampling MSI Yes MSI Yes CIR - Configuration in RUN Reparameterization possible in RUN Reparameterization possible in RUN Reparameterization possible in RUN Yes Calibration possible in RUN Yes Supply voltage Rated value (DC) permissible range, lower limit (DC) permissible range, upper limit (DC) permissible range, upper limit (DC) 28.8 V Reverse polarity protection Yes Input current Current consumption, max. 240 mA; with 24 V DC supply Encoder supply 24 V encoder supply Short-circuit protection Output current, max. 20 mA; Max. 47 mA per channel for a duration < 10 s Power Power available from the backplane bus 1.15 W Power loss Power loss, typ. 3.4 W		V1.0 / V5.1
● Oversampling ● MSI Pes CiR - Configuration in RUN Reparameterization possible in RUN Reparameterization possible in RUN Yes Calibration possible in RUN Yes Supply voltage Rated value (DC) permissible range, lower limit (DC) permissible range, upper limit (DC) permissible range, upper limit (DC) Reverse polarity protection Yes Input current Current consumption, max. 240 mA; with 24 ∨ DC supply 24 ∨ encoder supply 24 ∨ encoder supply ● Short-circuit protection Yes ● Output current, max. 20 mA; Max. 47 mA per channel for a duration < 10 s Power Power available from the backplane bus 1.15 W Power loss Power loss, typ. 3.4 W		
MSI CiR - Configuration in RUN Reparameterization possible in RUN Calibration possible in RUN Yes Supply voltage Rated value (DC) permissible range, lower limit (DC) permissible range, upper limit (DC) permissible range, upper limit (DC) permissible range, upper limit (DC) Reverse polarity protection Yes Input current Current consumption, max. 240 mA; with 24 V DC supply 24 V encoder supply 4 V encoder supply o Short-circuit protection Yes Output current, max. 20 mA; Max. 47 mA per channel for a duration < 10 s Power Power available from the backplane bus 1.15 W Power loss Power loss, typ. 3.4 W	Operating mode	
MSI CiR - Configuration in RUN Reparameterization possible in RUN Calibration possible in RUN Yes Supply voltage Rated value (DC) permissible range, lower limit (DC) permissible range, upper limit (DC) permissible range, upper limit (DC) permissible range, upper limit (DC) Reverse polarity protection Yes Input current Current consumption, max. 240 mA; with 24 V DC supply 24 V encoder supply 4 V encoder supply o Short-circuit protection Yes Output current, max. 20 mA; Max. 47 mA per channel for a duration < 10 s Power Power available from the backplane bus 1.15 W Power loss Power loss, typ. 3.4 W		Yes
Reparameterization possible in RUN Calibration possible in RUN Yes Supply voltage Rated value (DC) permissible range, lower limit (DC) permissible range, upper limit (DC) Reverse polarity protection Yes Input current Current consumption, max. 240 mA; with 24 V DC supply Encoder supply 24 V encoder supply • Short-circuit protection Yes • Output current, max. 20 mA; Max. 47 mA per channel for a duration < 10 s Power Power available from the backplane bus 1.15 W Power loss Power loss, typ. 3.4 W		Yes
Calibration possible in RUN Supply voltage Rated value (DC) permissible range, lower limit (DC) permissible range, upper limit (DC) Reverse polarity protection Yes Input current Current consumption, max. 240 mA; with 24 V DC supply Encoder supply 24 V encoder supply • Short-circuit protection Yes • Output current, max. 20 mA; Max. 47 mA per channel for a duration < 10 s Power Power available from the backplane bus 1.15 W Power loss Power loss, typ. 3.4 W	CiR - Configuration in RUN	
Rated value (DC) Permissible range, lower limit (DC) permissible range, upper limit (DC) Reverse polarity protection Yes Input current Current consumption, max. 240 mA; with 24 V DC supply 24 V encoder supply 24 V encoder supply • Short-circuit protection Yes • Output current, max. 20 mA; Max. 47 mA per channel for a duration < 10 s Power Power available from the backplane bus 1.15 W Power loss Power loss, typ. 3.4 W	Reparameterization possible in RUN	Yes
Rated value (DC) permissible range, lower limit (DC) permissible range, upper limit (DC) Reverse polarity protection Yes Input current Current consumption, max. 240 mA; with 24 V DC supply Encoder supply 24 V encoder supply • Short-circuit protection Yes • Output current, max. 20 mA; Max. 47 mA per channel for a duration < 10 s Power Power available from the backplane bus 1.15 W Power loss Power loss, typ. 3.4 W	Calibration possible in RUN	Yes
permissible range, lower limit (DC) permissible range, upper limit (DC) Reverse polarity protection Yes Input current Current consumption, max. 240 mA; with 24 V DC supply Encoder supply 24 V encoder supply Short-circuit protection Output current, max. 20 mA; Max. 47 mA per channel for a duration < 10 s Power Power available from the backplane bus 1.15 W Power loss Power loss, typ. 3.4 W	Supply voltage	
permissible range, upper limit (DC) Reverse polarity protection Yes Input current Current consumption, max. 240 mA; with 24 V DC supply Encoder supply 24 V encoder supply • Short-circuit protection • Output current, max. Yes Output current, max. 20 mA; Max. 47 mA per channel for a duration < 10 s Power Power available from the backplane bus 1.15 W Power loss Power loss, typ. 3.4 W	Rated value (DC)	24 V
Reverse polarity protection Input current Current consumption, max. 240 mA; with 24 V DC supply Encoder supply 24 V encoder supply • Short-circuit protection • Output current, max. Power Power available from the backplane bus 1.15 W Power loss Power loss, typ. 3.4 W	permissible range, lower limit (DC)	19.2 V
Input current Current consumption, max. 240 mA; with 24 V DC supply Encoder supply 24 V encoder supply • Short-circuit protection • Output current, max. Power Power available from the backplane bus 1.15 W Power loss Power loss, typ. 3.4 W	permissible range, upper limit (DC)	28.8 V
Current consumption, max. 240 mA; with 24 V DC supply Encoder supply 24 V encoder supply Short-circuit protection Output current, max. Power Power available from the backplane bus 1.15 W Power loss Power loss, typ. 3.4 W	Reverse polarity protection	Yes
Encoder supply 24 V encoder supply Short-circuit protection Output current, max. Power Power available from the backplane bus 1.15 W Power loss Power loss, typ. 3.4 W	Input current	
24 V encoder supply Short-circuit protection Output current, max. Power Power available from the backplane bus 1.15 W Power loss Power loss, typ. 3.4 W	Current consumption, max.	240 mA; with 24 V DC supply
Short-circuit protection Output current, max. Power Power available from the backplane bus 1.15 W Power loss Power loss, typ. 3.4 W	Encoder supply	
Output current, max. 20 mA; Max. 47 mA per channel for a duration < 10 s Power Power available from the backplane bus 1.15 W Power loss Power loss, typ. 3.4 W	24 V encoder supply	
Power available from the backplane bus Power loss Power loss, typ. 3.4 W	Short-circuit protection	Yes
Power available from the backplane bus 1.15 W Power loss Power loss, typ. 3.4 W	 Output current, max. 	20 mA; Max. 47 mA per channel for a duration < 10 s
Power loss Power loss, typ. 3.4 W	Power	
Power loss, typ. 3.4 W	Power available from the backplane bus	1.15 W
* 21	Power loss	
Analog inputs	Power loss, typ.	3.4 W
	Analog inputs	

Number of angles innut-	0
Number of analog inputs	8
For current measurement	8
For voltage measurement	8
permissible input voltage for voltage input (destruction limit), max.	28.8 V
permissible input current for current input (destruction limit), max.	40 mA
Input ranges (rated values), voltages	
• 0 to +5 V	No
• 0 to +10 V	No
• 1 V to 5 V	Yes
— Input resistance (1 V to 5 V)	50 kΩ
• -10 V to +10 V	Yes
— Input resistance (-10 V to +10 V)	100 kΩ
• -2.5 V to +2.5 V	No
• -25 mV to +25 mV	No
• -250 mV to +250 mV	No
• -5 V to +5 V	Yes
— Input resistance (-5 V to +5 V)	50 kΩ
• -50 mV to +50 mV	No
• -500 mV to +500 mV	No
• -80 mV to +80 mV	No
Input ranges (rated values), currents	
• 0 to 20 mA	Yes
— Input resistance (0 to 20 mA)	41 Ω ; Plus approx. 42 ohms for overvoltage protection by PTC
• -20 mA to +20 mA	Yes
— Input resistance (-20 mA to +20 mA)	41 Ω ; Plus approx. 42 ohms for overvoltage protection by PTC
• 4 mA to 20 mA	Yes
— Input resistance (4 mA to 20 mA)	41 Ω; Plus approx. 42 ohms for overvoltage protection by PTC
Input ranges (rated values), thermocouples	
• Type B	No
• Type C	No
• Type E	No
• Type J	No
• Type K	No
• Type L	No
• Type N	No
• Type R	No
• Type S	No
• Type T	No
Type TXK/TXK(L) to GOST Input ranges (rated values) resistance thermometer.	No
Input ranges (rated values), resistance thermometer • Cu 10	No
Cu 10 Cu 10 according to GOST	No
• Cu 10 according to GOS1	No
Cu 50 according to GOST	No
• Cu 100	No
Cu 100 according to GOST	No
• Ni 10	No
Ni 10 according to GOST	No
• Ni 100	No
Ni 100 according to GOST	No
• Ni 1000	No
Ni 1000 according to GOST	No
• LG-Ni 1000	No
• Ni 120	No
Ni 120 according to GOST	No
• Ni 200	No
Ni 200 according to GOST	No
• Ni 500	No
Ni 500 according to GOST	No
• 141 300 according to Goot	140

• Pt 10	No
 Pt 10 according to GOST 	No
● Pt 50	No
 Pt 50 according to GOST 	No
• Pt 100	No
 Pt 100 according to GOST 	No
• Pt 1000	No
 Pt 1000 according to GOST 	No
• Pt 200	No
 Pt 200 according to GOST 	No
• Pt 500	No
 Pt 500 according to GOST 	No
Input ranges (rated values), resistors	
• 0 to 150 ohms	No
• 0 to 300 ohms	No
• 0 to 600 ohms	No
• 0 to 3000 ohms	No
• 0 to 6000 ohms	No
• PTC	No
Cable length	
• shielded, max.	800 m
Analog value generation for the inputs	330
Integration and conversion time/resolution per channel	
Resolution with overrange (bit including sign), max.	16 bit
Basic execution time of the module (all channels	
released)	62.5 µs; independent of number of activated channels
Smoothing of measured values	
parameterizable	Yes
Step: None	Yes
Step: low	Yes
Step: Medium	Yes
Step: High	Yes
Encoder	
Connection of signal encoders	
for voltage measurement	Yes
for current measurement as 2-wire transducer	Yes
Burden of 2-wire transmitter, max.	820 Ω
for current measurement as 4-wire transducer	Yes
for resistance measurement with two-wire connection	No
for resistance measurement with three-wire connection	No
for resistance measurement with four-wire connection	No
	No
Errors/accuracies	0.00 %
Linearity error (relative to input range), (+/-)	0.02 %
Temperature error (relative to input range), (+/-)	0.005 %/K
Crosstalk between the inputs, max.	-60 dB
Repeat accuracy in steady state at 25 °C (relative to input range), (+/-)	0.02 %
Operational error limit in overall temperature range	
 Voltage, relative to input range, (+/-) 	0.3 %
• Current, relative to input range, (+/-)	0.3 %
Basic error limit (operational limit at 25 °C)	
 Voltage, relative to input range, (+/-) 	0.2 %
• Current, relative to input range, (+/-)	0.2 %
Interference voltage suppression for f = n x (f1 +/- 1 %), f1 = interfe	rence frequency
Common mode voltage, max.	10 V
Common mode interference, min.	50 dB at 400 Hz; 60 dB at 60 / 50 / 10 Hz
Isochronous mode	
Filtering and processing time (TCI), min.	80 μs
Bus cycle time (TDP), min.	250 μs
Interrupts/diagnostics/status information	
	Voc
Diagnostics function	Yes

Alarms	
Diagnostic alarm	Yes
Limit value alarm	Yes; two upper and two lower limit values in each case
Diagnoses	
Monitoring the supply voltage	Yes
Wire-break	Yes; only for 1 5 V and 4 20 mA
Overflow/underflow	Yes
Diagnostics indication LED	
• RUN LED	Yes; green LED
• ERROR LED	Yes; red LED
 Monitoring of the supply voltage (PWR-LED) 	Yes; green LED
Channel status display	Yes; green LED
for channel diagnostics	Yes; red LED
• for module diagnostics	Yes; red LED
Potential separation	
Potential separation channels	
• between the channels	No
 between the channels, in groups of 	8
 between the channels and backplane bus 	Yes
 between the channels and the power supply of the electronics 	Yes
Permissible potential difference	
between the inputs (UCM)	20 V DC
Between the inputs and MANA (UCM)	10 V DC
Isolation	
Isolation tested with	707 V DC (type test)
product functions / security / header	
signed firmware update	No
data integrity	No
Ambient conditions	
Ambient temperature during operation	
 horizontal installation, min. 	-25 °C; From FS02
 horizontal installation, max. 	60 °C
• vertical installation, min.	-25 °C; From FS02
vertical installation, max.	40 °C
Altitude during operation relating to sea level	
 Installation altitude above sea level, max. 	5 000 m; Restrictions for installation altitudes > 2 000 m, see manual
Dimensions	
Width	35 mm
Height	147 mm
Depth	129 mm
Weights	
Weight, approx.	300 g

last modified:

4/25/2024

Data sheet

6ES7531-7PF00-0AB0



SIMATIC S7-1500 analog input module AI 8xU/R/RTD/TC HF, 16 bit resolution, up to 21 bit Resolution at RT and TC, accuracy 0.1%, 8 channels in groups of 1; common mode voltage: 30 V AC/60 V DC, Diagnostics; Hardware interrupts Scalable temperature measuring range, thermocouple type C, Calibrate in RUN; Delivery including infeed element, shield bracket and shield terminal: Front connector (screw terminals or push-in) to be ordered separately

General information	
Product type designation	AI 8xU/R/RTD/TC HF
HW functional status	From FS01
Firmware version	V1.1.0
 FW update possible 	Yes
Product function	
• I&M data	Yes; I&M0 to I&M3
 Isochronous mode 	No
 Prioritized startup 	Yes
 Measuring range scalable 	Yes
 Scalable measured values 	No
 Adjustment of measuring range 	No
Engineering with	
 STEP 7 TIA Portal configurable/integrated from version 	V14 / -
 STEP 7 configurable/integrated from version 	V5.5 SP3 / -
 PROFIBUS from GSD version/GSD revision 	V1.0 / V5.1
PROFINET from GSD version/GSD revision	V2.3 / -
Operating mode	
 Oversampling 	No
• MSI	Yes
CiR - Configuration in RUN	
Reparameterization possible in RUN	Yes
Calibration possible in RUN	Yes
Supply voltage	
Rated value (DC)	24 V
permissible range, lower limit (DC)	19.2 V
permissible range, upper limit (DC)	28.8 V
Reverse polarity protection	Yes
Input current	
Current consumption, max.	55 mA; with 24 V DC supply
Power	
Power available from the backplane bus	0.85 W
Power loss	
Power loss, typ.	1.9 W
Analog inputs	
Number of analog inputs	8; Plus one additional RTD (reference) channel
For voltage measurement	8; Plus one additional RTD (reference) channel
For resistance/resistance thermometer measurement	8; Plus one additional RTD (reference) channel
For thermocouple measurement	8; Plus one additional RTD (reference) channel
permissible input voltage for voltage input (destruction limit),	20 V

max.	
Constant measurement current for resistance-type transmitter,	150 Ohm, 300 Ohm, 600 Ohm, Cu10, Cu50, Cu100, Ni10, Ni100, Ni120, Ni200
typ.	Pt10, Pt50, Pt100, Pt200 climate: 1 mA; 6 kOhm, Ni500, Ni1000, LG-Ni1000, Pt200 standard, Pt500, Pt1000, PTC: 0.25 mA
Technical unit for temperature measurement adjustable	Yes; °C/°F/K
Input ranges (rated values), voltages	
• 0 to +5 V	No
• 0 to +10 V	No
• 1 V to 5 V	No
• -1 V to +1 V	Yes
— Input resistance (-1 V to +1 V)	10 ΜΩ
• -10 V to +10 V	No
• -2.5 V to +2.5 V	No
• -25 mV to +25 mV	Yes
— Input resistance (-25 mV to +25 mV)	10 ΜΩ
• -250 mV to +250 mV	Yes
— Input resistance (-250 mV to +250 mV)	10 ΜΩ
• -5 V to +5 V	No
• -50 mV to +50 mV	Yes
— Input resistance (-50 mV to +50 mV)	10 ΜΩ
● -500 mV to +500 mV	Yes
— Input resistance (-500 mV to +500 mV)	10 ΜΩ
● -80 mV to +80 mV	Yes
— Input resistance (-80 mV to +80 mV)	10 ΜΩ
Input ranges (rated values), currents	
• 0 to 20 mA	No
• -20 mA to +20 mA	No
• 4 mA to 20 mA	No
Input ranges (rated values), thermocouples	Vec
Type B Input registance (Type B)	Yes 10 MΩ
— Input resistance (Type B)◆ Type C	Yes
— Input resistance (Type C)	10 ΜΩ
• Type E	Yes
— Input resistance (Type E)	10 ΜΩ
• Type J	Yes
Input resistance (type J)	10 ΜΩ
• Type K	Yes
— Input resistance (Type K)	10 ΜΩ
• Type L	No
• Type N	Yes
— Input resistance (Type N)	10 ΜΩ
• Type R	Yes
— Input resistance (Type R)	10 ΜΩ
• Type S	Yes
— Input resistance (Type S)	10 ΜΩ
• Type T	Yes
— Input resistance (Type T)	10 ΜΩ
 Type TXK/TXK(L) to GOST 	Yes
 Input resistance (Type TXK/TXK(L) to GOST) 	10 ΜΩ
Input ranges (rated values), resistance thermometer	
• Cu 10	Yes; Standard/climate
— Input resistance (Cu 10)	10 ΜΩ
Cu 10 according to GOST	Yes; Standard/climate
 Input resistance (Cu 10 according to GOST) 	10 ΜΩ
• Cu 50	Yes; Standard/climate
— Input resistance (Cu 50)	10 ΜΩ
Cu 50 according to GOST	Yes; Standard/climate
— Input resistance (Cu 50 according to GOST)	10 ΜΩ
• Cu 100	Yes; Standard/climate
 Input resistance (Cu 100) 	10 ΜΩ

Cu 100 according to GOST	Yes; Standard/climate
 Input resistance (Cu 100 according to GOST) 	10 ΜΩ
• Ni 10	Yes; Standard/climate
— Input resistance (Ni 10)	10 ΜΩ
Ni 10 according to GOST	Yes; Standard/climate
 Input resistance (Ni 10 according to GOST) 	10 ΜΩ
• Ni 100	Yes; Standard/climate
— Input resistance (Ni 100)	10 ΜΩ
Ni 100 according to GOST	Yes; Standard/climate
— Input resistance (Ni 100 according to GOST)	10 ΜΩ
• Ni 1000	Yes; Standard/climate
— Input resistance (Ni 1000)	10 ΜΩ
Ni 1000 according to GOST	Yes; Standard/climate
Input resistance (Ni 1000 according to GOST)	10 ΜΩ
• LG-Ni 1000	Yes; Standard/climate
— Input resistance (LG-Ni 1000)	10 MΩ
• Ni 120	Yes; Standard/climate
— Input resistance (Ni 120)	10 MΩ
Ni 120 according to GOST Input registance (Ni 120 according to GOST)	Yes; Standard/climate
— Input resistance (Ni 120 according to GOST)	10 MΩ
• Ni 200	Yes; Standard/climate
— Input resistance (Ni 200)	10 MΩ
Ni 200 according to GOST	Yes; Standard/climate
— Input resistance (Ni 200 according to GOST)	10 ΜΩ
• Ni 500	Yes; Standard/climate
— Input resistance (Ni 500)	10 ΜΩ
Ni 500 according to GOST	Yes; Standard/climate
 Input resistance (Ni 500 according to GOST) 	10 ΜΩ
• Pt 10	Yes; Standard/climate
— Input resistance (Pt 10)	10 ΜΩ
Pt 10 according to GOST	Yes; Standard/climate
 Input resistance (Pt 10 according to GOST) 	10 ΜΩ
• Pt 50	Yes; Standard/climate
— Input resistance (Pt 50)	10 ΜΩ
Pt 50 according to GOST	Yes; Standard/climate
 Input resistance (Pt 50 according to GOST) 	10 ΜΩ
• Pt 100	Yes; Standard/climate
— Input resistance (Pt 100)	10 ΜΩ
Pt 100 according to GOST	Yes; Standard/climate
 — Input resistance (Pt 100 according to GOST) 	10 ΜΩ
• Pt 1000	Yes; Standard/climate
— Input resistance (Pt 1000)	10 ΜΩ
Pt 1000 according to GOST	Yes; Standard/climate
 Input resistance (Pt 1000 according to GOST) 	10 ΜΩ
• Pt 200	Yes; Standard/climate
— Input resistance (Pt 200)	10 ΜΩ
Pt 200 according to GOST	Yes; Standard/climate
— Input resistance (Pt 200 according to GOST)	10 ΜΩ
• Pt 500	Yes; Standard/climate
— Input resistance (Pt 500)	10 ΜΩ
Pt 500 according to GOST	Yes; Standard/climate
— Input resistance (Pt 500 according to GOST)	10 M Ω
ut ranges (rated values), resistors	10 1111
• 0 to 150 ohms	Yes
	10 ΜΩ
Input resistance (0 to 150 ohms)0 to 300 ohms	
	Yes
— Input resistance (0 to 300 ohms)	10 ΜΩ
• 0 to 600 ohms	Yes
— Input resistance (0 to 600 ohms)	10 ΜΩ
• 0 to 3000 ohms	No V
 0 to 6000 ohms 	Yes

— Input resistance (0 to 6000 ohms)	10 ΜΩ
• PTC	Yes
— Input resistance (PTC)	10 ΜΩ
Thermocouple (TC)	
Temperature compensation	
— parameterizable	Yes
 internal temperature compensation 	Yes
 external temperature compensation via RTD 	Yes
 Compensation for 0 °C reference point temperature 	Yes; fixed value can be set
Reference channel of the module	Yes; 9th channel that can be used as a genuine 9th RTD channel regardless of the parameterization of the other channels, or that can be used for compensation in the case of TC measurement
Cable length	
• shielded, max.	800 m; at U; 200 m at R/RTD/TC
Analog value generation for the inputs	
Integration and conversion time/resolution per channel	
 Resolution with overrange (bit including sign), max. 	21 bit; For measuring mode RTC and TC when using the function "Scalable temperature measuring range" (32 bit REAL format); 16 bit for measuring mode R and U; 16 bit for all measuring modes when using the S7 format (16 bit INTEGER)
 Integration time, parameterizable 	Yes
• Integration time (ms)	Fast mode: 2.5 / 16.67 / 20 / 100 ms, standard mode: 7.5 / 50 / 60 / 300 ms
Basic conversion time, including integration time (ms)	Fast mode: 4 / 18 / 22 / 102 ms; Standard mode: 9 / 52 / 62 / 302 ms
 additional conversion time for wire-break monitoring 	Thermocouples, 150 Ohm, 300 Ohm, 600 Ohm, Cu10, Cu50, Cu100, Ni10, Ni100, Ni120, Ni200, Pt10, Pt50, Pt100: 4 ms; 6 kOhm, Ni500, Ni1000, LG-Ni1000, Pt200, Pt500, Pt1000: 13 ms
 Interference voltage suppression for interference frequency f1 in Hz 	400 / 60 / 50 / 10 Hz
 Basic execution time of the module (all channels released) 	Corresponds to the channel with the highest basic conversion time
Smoothing of measured values	
parameterizable	Yes
Step: None	Yes
• Step: low	Yes
Step: Medium	Yes
Step: High	Yes
Encoder	
Connection of signal encoders	
for voltage measurement	Yes
for current measurement as 2-wire transducer	No
for current measurement as 4-wire transducer	No
for resistance measurement with two-wire connection	Yes
for resistance measurement with three-wire connection	Yes; All measuring ranges except PTC; internal compensation of the cable resistances
• for resistance measurement with four-wire connection	Yes; All measuring ranges except PTC
Errors/accuracies	
Linearity error (relative to input range), (+/-)	0.02 %
Temperature error (relative to input range), (+/-)	0.005 %/K
Crosstalk between the inputs, max.	-80 dB
Repeat accuracy in steady state at 25 °C (relative to input range), (+/-)	0.02 %
Temperature error of internal compensation	±1,5 °C
Operational error limit in overall temperature range	
 Voltage, relative to input range, (+/-) 	0.1 %
 Resistance, relative to input range, (+/-) 	0.1 %
• Resistance thermometer, relative to input range, (+/-)	Cuxxx Standard: ± 0.5 K, Cuxxx Klima: ± 0.5 K, Ptxxx Standard: ± 1 K, Ptxxx Klima: ± 0.5 K, Nixxx Standard: ± 0.5 K, Nixxx Klima: ± 0.3 K
Thermocouple, relative to input range, (+/-)	Type B: > 600 °C ±2 K, Type E: > -200 °C ±1 K, Type J: > -210 °C ±1 K, Type K: > -200 °C ±2 K, Type N: > -200 °C ±2 K, Type R: > 0 °C ±2 K, Type S: > 0 °C ±2 K, Type T: > -200 °C ±1 K, Type C: ±4 K, Type TXK/TXK(L): ±1 K
Basic error limit (operational limit at 25 °C)	
 Voltage, relative to input range, (+/-) 	0.05 %
 Resistance, relative to input range, (+/-) 	0.05 %
• Resistance thermometer, relative to input range, (+/-)	Cuxxx Standard: ± 0.3 K, Cuxxx Klima: ± 0.2 K, Ptxxx Standard: ± 0.5 K, Ptxxx Klima: ± 0.2 K, Nixxx Standard: ± 0.3 K, Nixxx Klima: ± 0.15 K

• Thermocouple, relative to input range, (+/-)	Type B: > 600 °C ±1 K, Type E: > -200 °C ±0.5 K, Type J: > -210 °C ±0.5 K, Type K: > -200 °C ±1 K, Type N: > -200 °C ±1 K, Type R: > 0 °C ±1 K, Type S: > 0 °C ±1 K, Type T: > -200 °C ±0.5 K, Type C: ±2 K, Type TXK/TXK(L): \pm 0.5 K
Interference voltage suppression for f = n x (f1 +/- 1 %), f1 = inter	
Series mode interference (peak value of interference < rated value of input range), min.	80 dB; in the Standard operating mode, 40 dB in the Fast operating mode
 Common mode voltage, max. 	60 V DC/30 V AC
 Common mode interference, min. 	80 dB
Interrupts/diagnostics/status information	
Diagnostics function	Yes
Alarms	
Diagnostic alarm	Yes
Limit value alarm	Yes; two upper and two lower limit values in each case
Diagnoses	
Monitoring the supply voltage	Yes
Wire-break	Yes; Only with TC, R, RTD
Overflow/underflow	Yes
Diagnostics indication LED	
• RUN LED	Yes; green LED
• ERROR LED	Yes; red LED
Monitoring of the supply voltage (PWR-LED)	Yes; green LED
Channel status display	Yes; green LED
· •	Yes; red LED
• for channel diagnostics	
for module diagnostics	Yes; red LED
Potential separation	
Potential separation channels	
 between the channels 	Yes
 between the channels, in groups of 	1
 between the channels and backplane bus 	Yes
 between the channels and the power supply of the electronics 	Yes
Permissible potential difference	
between different circuits	60 V DC/30 V AC; insulation rated for 120 V AC basic insulation: between the channels and the supply voltage L+; between the channels and the backplane bus; between the channels
Isolation	
Isolation tested with	2 000 V DC between the channels and the supply voltage L+; 2 000 V DC between the channels and the backplane bus; 2 000 V DC between the channels; 707 V DC (type test) between the supply voltage L+ and the backplane bus
Standards, approvals, certificates	
Suitable for applications according to AMS 2750	Yes; Declaration of Conformity, see online support entry 109757262
Suitable for applications according to CQI-9	Yes; Based on AMS 2750 E
product functions / security / header	
signed firmware update	No
data integrity	No
Ambient conditions	
Ambient temperature during operation	
horizontal installation, min.	-30 °C; From FS02
horizontal installation, max.	60 °C
	-30 °C; From FS02
vertical installation, min.	
vertical installation, max. Piransions	40 °C
Dimensions	
Width	35 mm
Height	147 mm
Depth Weights	129 mm
Weight, approx.	290 g
Other	
Note:	for the R/RDT three-wire measurement, the conductor compensation is made
NOIC.	alternating with the measurement; this then requires two module cycles for a measured value



Data sheet 6ES7531-7QD00-0AB0



SIMATIC S7-1500 Analog input module AI 4xU/I/RTD/TC ST, 16 bit resolution, Accuracy 0.3%, 4 channels in groups of 4; 2 channels for RTD measurement; Common mode voltage 10 V; Diagnostics; Hardware interrupts; Delivery including push-in front connector, infeed element, shield bracket, and shield terminal

General information	
Product type designation	AI 4xU/I/RTD/TC ST
HW functional status	From FS01
Firmware version	V1.0.0
FW update possible	Yes
Product function	
• I&M data	Yes; I&M0 to I&M3
 Isochronous mode 	No
Prioritized startup	No
Measuring range scalable	No
 Scalable measured values 	No
 Adjustment of measuring range 	No
Engineering with	
 STEP 7 TIA Portal configurable/integrated from version 	V13 / V13.0.2
 STEP 7 configurable/integrated from version 	V5.5 SP3 / -
 PROFIBUS from GSD version/GSD revision 	V1.0 / V5.1
 PROFINET from GSD version/GSD revision 	V2.3 / -
Operating mode	
 Oversampling 	No
• MSI	Yes
CiR - Configuration in RUN	
Reparameterization possible in RUN	Yes
Calibration possible in RUN	Yes
Supply voltage	
Rated value (DC)	24 V
permissible range, lower limit (DC)	19.2 V
permissible range, upper limit (DC)	28.8 V
Reverse polarity protection	Yes
Input current	
Current consumption, max.	165 mA
Encoder supply	
24 V encoder supply	
Short-circuit protection	Yes
 Output current, max. 	20 mA; Max. 47 mA per channel for a duration < 10 s
Power	
Power available from the backplane bus	0.7 W
Power loss	
Power loss, typ.	2.3 W
Analog inputs	
Number of analog inputs	4

- For authors made was mant	4
For current measurement	4
For voltage measurement	4
 For resistance/resistance thermometer measurement 	2
For thermocouple measurement	4
permissible input voltage for voltage input (destruction limit), max.	28.8 V
permissible input current for current input (destruction limit), max.	40 mA
Constant measurement current for resistance-type transmitter, typ.	150 Ohm, 300 Ohm, 600 Ohm, Pt100, Pt200, Ni100: 1.25 mA; 6 000 Ohm, Pt500, Pt1000, Ni1000, LG-Ni1000: 0.625 mA; PTC: 0.472 mA
Technical unit for temperature measurement adjustable	Yes; °C/°F/K
Analog input with oversampling	No
Standardization of measured values	No
Input ranges (rated values), voltages	
• 0 to +5 V	No
• 0 to +10 V	No
• 1 V to 5 V	Yes
— Input resistance (1 V to 5 V)	100 kΩ
- Input resistance (1 V to 5 V) • -1 V to +1 V	Yes
— Input resistance (-1 V to +1 V)	10 ΜΩ
• -10 V to +10 V	Yes
— Input resistance (-10 V to +10 V)	100 kΩ
• -2.5 V to +2.5 V	Yes
— Input resistance (-2.5 V to +2.5 V)	10 ΜΩ
• -25 mV to +25 mV	No
• -250 mV to +250 mV	Yes
— Input resistance (-250 mV to +250 mV)	10 ΜΩ
• -5 V to +5 V	Yes
— Input resistance (-5 V to +5 V)	100 kΩ
• -50 mV to +50 mV	Yes
— Input resistance (-50 mV to +50 mV)	10 ΜΩ
• -500 mV to +500 mV	Yes
— Input resistance (-500 mV to +500 mV)	10 ΜΩ
• -80 mV to +80 mV	Yes
 Input resistance (-80 mV to +80 mV) 	10 ΜΩ
Input ranges (rated values), currents	
• 0 to 20 mA	Yes
— Input resistance (0 to 20 mA)	25 Ω ; Plus approx. 42 ohms for overvoltage protection by PTC
• -20 mA to +20 mA	Yes
— Input resistance (-20 mA to +20 mA)	25 Ω; Plus approx. 42 ohms for overvoltage protection by PTC
• 4 mA to 20 mA	Yes
— Input resistance (4 mA to 20 mA)	25 Ω; Plus approx. 42 ohms for overvoltage protection by PTC
Input ranges (rated values), thermocouples	Van
• Type B	Yes
— Input resistance (Type B)	10 ΜΩ
• Type C	No
• Type E	Yes
— Input resistance (Type E)	10 ΜΩ
• Type J	Yes
— Input resistance (type J)	10 ΜΩ
• Type K	Yes
— Input resistance (Type K)	10 ΜΩ
• Type L	No
• Type N	Yes
— Input resistance (Type N)	10 ΜΩ
• Type R	Yes
Input resistance (Type R)	10 ΜΩ
• Type S	Yes
— Input resistance (Type S)	10 ΜΩ
Type T	Yes
**	
— Input resistance (Type T)	10 ΜΩ
■ Type U	No

Type TXK/TXK(L) to GOST	No
Input ranges (rated values), resistance thermometer	
• Cu 10	No
 Cu 10 according to GOST 	No
• Cu 50	No
Cu 50 according to GOST	No
• Cu 100	No
 Cu 100 according to GOST 	No
• Ni 10	No
 Ni 10 according to GOST 	No
• Ni 100	Yes; Standard/climate
— Input resistance (Ni 100)	10 ΜΩ
Ni 100 according to GOST	No
• Ni 1000	Yes; Standard/climate
— Input resistance (Ni 1000)	10 ΜΩ
Ni 1000 according to GOST	No
• LG-Ni 1000	Yes; Standard/climate
— Input resistance (LG-Ni 1000)	10 MΩ
— Input resistance (±0-141 1000) ■ Ni 120	No
Ni 120 Ni 120 according to GOST	No
Ni 200 Ni 200	No
Ni 200 according to GOSTNi 500	No No
	No No
Ni 500 according to GOST	No No
• Pt 10	No No
Pt 10 according to GOST	No
• Pt 50	No
Pt 50 according to GOST	No
• Pt 100	Yes; Standard/climate
— Input resistance (Pt 100)	10 ΜΩ
 Pt 100 according to GOST 	No
• Pt 1000	Yes; Standard/climate
— Input resistance (Pt 1000)	10 ΜΩ
 Pt 1000 according to GOST 	No
• Pt 200	Yes; Standard/climate
— Input resistance (Pt 200)	10 ΜΩ
 Pt 200 according to GOST 	No
• Pt 500	Yes; Standard/climate
— Input resistance (Pt 500)	10 ΜΩ
Pt 500 according to GOST	No
Input ranges (rated values), resistors	
• 0 to 150 ohms	Yes
— Input resistance (0 to 150 ohms)	10 ΜΩ
• 0 to 300 ohms	Yes
— Input resistance (0 to 300 ohms)	10 ΜΩ
• 0 to 600 ohms	Yes
— Input resistance (0 to 600 ohms)	10 ΜΩ
• 0 to 3000 ohms	No
• 0 to 6000 ohms	Yes
— Input resistance (0 to 6000 ohms)	10 ΜΩ
• PTC	Yes
— Input resistance (PTC)	10 ΜΩ
Thermocouple (TC)	
Temperature compensation	
— parameterizable	Yes
internal temperature compensation	Yes
external temperature compensation external temperature compensation via RTD	Yes
— Compensation for 0 °C reference point temperature	Yes; fixed value can be set
Reference channel of the module	No
Cable length	110
	800 m; for II/I 200 m for P/PTD 50 m for TC
shielded, max.	800 m; for U/I, 200 m for R/RTD, 50 m for TC

Analog value generation for the inputs	
Integration and conversion time/resolution per channel	
Resolution with overrange (bit including sign), max.	16 bit
Integration time, parameterizable	Yes
Integration time (ms)	2,5 / 16,67 / 20 / 100 ms
Basic conversion time, including integration time (ms)	9 / 23 / 27 / 107 ms
 additional conversion time for wire-break monitoring 	9 ms (to be considered in R/RTD/TC measurement)
 additional conversion time for resistance 	150 ohm, 300 ohm, 600 ohm, Pt100, Pt200, Ni100: 2 ms, 6000 ohm, Pt500,
measurement	Pt1000, Ni1000, LG-Ni1000, PTC: 4 ms
 Interference voltage suppression for interference frequency f1 in Hz 	400 / 60 / 50 / 10
Time for offset calibration (per module) • Time for offset calibration (per module)	Basic conversion time of the slowest channel
Smoothing of measured values	
parameterizable	Yes
Step: None	Yes
Step: low	Yes
Step: Medium	Yes
Step: High	Yes
Encoder	
Connection of signal encoders	
for voltage measurement	Yes
for current measurement as 2-wire transducer	Yes
— Burden of 2-wire transmitter, max.	820 Ω
for current measurement as 4-wire transducer	Yes
for resistance measurement with two-wire connection	Yes; Only for PTC
• for resistance measurement with three-wire connection	Yes; All measuring ranges except PTC; internal compensation of the cable resistances
• for resistance measurement with four-wire connection	Yes; All measuring ranges except PTC
Errors/accuracies	
Linearity error (relative to input range), (+/-)	0.02 %
Temperature error (relative to input range), (+/-)	0.005 %/K; With TC type T 0.02 ± % / K
Crosstalk between the inputs, max.	-80 dB
Repeat accuracy in steady state at 25 °C (relative to input range), (+/-)	0.02 %
Temperature error of internal compensation	±6 °C
note regarding accuracy	at temperatures below 0 $^{\circ}\text{C},$ the figures for operating error and temperature error are doubled
Operational error limit in overall temperature range	
 Voltage, relative to input range, (+/-) 	0.3 %
 Current, relative to input range, (+/-) 	0.3 %
 Resistance, relative to input range, (+/-) 	0.3 %
• Resistance thermometer, relative to input range, (+/-)	0.3 %; Ptxxx standard: \pm 1.5 K, Ptxxx climate: \pm 0.5 K, Nixxx standard: \pm 0.5 K, Nixxx climate: \pm 0.3 K
• Thermocouple, relative to input range, (+/-)	0.3 %; Type B: > 600 °C ±4.6 K, type E: > -200 °C ±1.5 K, type J: > -210 °C ±1.9 K, type K: > -200 °C ±2.4 K, type N: > -200 °C ±2.9 K, type R: > 0 °C ±4.7 K, type S: > 0 °C ±4.6 K, type T: > -200 °C ±2.4 K
Basic error limit (operational limit at 25 °C)	
 Voltage, relative to input range, (+/-) 	0.1 %
 Current, relative to input range, (+/-) 	0.1 %
 Resistance, relative to input range, (+/-) 	0.1 %
• Resistance thermometer, relative to input range, (+/-)	0.1 %; Ptxxx standard: ± 0.7 K, Ptxxx climate: ± 0.2 K, Nixxx standard: ± 0.3 K, Nixxx climate: ± 0.15 K
• Thermocouple, relative to input range, (+/-)	0.1 %; Type B: > 600 °C ±1.7 K, type E: > -200 °C ±0.7 K, type J: > -210 °C ±0.8 K, type K: > -200 °C ±1.2 K, type N: > -200 °C ±1.2 K, type R: > 0 °C ±1.9
Interference voltage suppression for fig. p.y. (61 17 4 97) 64 - interfer	K, type S: > 0 °C ±1.9 K, type T: > -200 °C ±0.8 K
 Interference voltage suppression for f = n x (f1 +/- 1 %), f1 = interference Series mode interference (peak value of interference < rated value of input range), min. 	40 dB
Common mode voltage, max.	10 V
Common mode interference, min.	60 dB
Interrupts/diagnostics/status information	
Diagnostics function	Yes
Alarms	
Diagnostic alarm	Yes

Limit value alarm	Yes; two upper and two lower limit values in each case
Diagnoses	res, two upper and two lower minit values in each ease
Monitoring the supply voltage	Yes
Wire-break	Yes; Only for 1 to 5 V, 4 to 20 mA, TC, R, and RTD
Overflow/underflow	Yes
	res
Diagnostics indication LED	Vac area IFD
RUN LED ERROR LED	Yes; green LED
	Yes; red LED
Monitoring of the supply voltage (PWR-LED) Channel status display	Yes; green LED
Channel status display for about a ligrary of its	Yes; green LED
for channel diagnostics for module diagnostics	Yes; red LED
• for module diagnostics	Yes; red LED
Potential separation	
Potential separation channels	
between the channels	No .
between the channels, in groups of	4
between the channels and backplane bus	Yes
 between the channels and the power supply of the electronics 	Yes
Permissible potential difference	
between the inputs (UCM)	20 V DC
Between the inputs and MANA (UCM)	10 V DC
Isolation	
Isolation tested with	707 V DC (type test)
product functions / security / header	
signed firmware update	No
data integrity	No
Ambient conditions	
Ambient temperature during operation	
 horizontal installation, min. 	-25 °C; From FS03
 horizontal installation, max. 	60 °C
 vertical installation, min. 	-25 °C; From FS03
 vertical installation, max. 	40 °C
Altitude during operation relating to sea level	
 Installation altitude above sea level, max. 	5 000 m; Restrictions for installation altitudes > 2 000 m, see manual
Dimensions	
Width	25 mm
Height	147 mm
Depth	129 mm
Weights	
Weight, approx.	210 g
Other	
Note:	Supplied incl. 40-pole push-in front connectors. Additional basic error and noise for integration time = 2.5 ms: Voltage: ±250 mV (±0.02%), ±80 mV (±0.05%), ±50 mV (±0.05%); resistance: 150 Ohms (±0.02%); resistance thermometer: Pt100 climate: ±0.08 K, Ni100 climate: ±0.08 K; thermoelement: Type B, R, S: ±3 K, type E, J, K, N, T: ±1 K

6ES7531-7QF00-0AB0

Data sheet



SIMATIC S7-1500 Analog input module, AI 8xU/I/R/RTD BA, 16 bit resolution, Accuracy 0.5%, 8 channels in groups of 8; Common mode voltage 4 V DC, Diagnostics; Hardware interrupts; Delivery including infeed element, shield bracket and shield terminal: Front connector (screw terminals or push-in) to be ordered separately

General information	
Product type designation	AI 8xU/I/R/RTD BA
HW functional status	FS01
Firmware version	V1.0.0
 FW update possible 	Yes
Product function	
• I&M data	Yes; I&M0 to I&M3
Prioritized startup	No
Engineering with	
STEP 7 TIA Portal configurable/integrated from version	V15.1 / V16
 STEP 7 configurable/integrated from version 	V5.5 SP3 / -
 PROFIBUS from GSD version/GSD revision 	V1.0 / V5.1
 PROFINET from GSD version/GSD revision 	V2.3 / -
Operating mode	
Oversampling	No
• MSI	Yes
CiR - Configuration in RUN	
Reparameterization possible in RUN	Yes
Calibration possible in RUN	No
Power	
Power available from the backplane bus	0.85 W
Power loss	
Power loss, typ.	0.9 W
Analog inputs	
Number of analog inputs	8
 For current measurement 	8
For voltage measurement	8
• For resistance/resistance thermometer measurement	8
permissible input voltage for voltage input (destruction limit), max.	12 V; 12 V continuous, 30 V for max. 1 s
permissible input current for current input (destruction limit), max.	40 mA
Constant measurement current for resistance-type transmitter, typ.	230 370 μΑ
Technical unit for temperature measurement adjustable	Yes; °C/°F/K
Input ranges (rated values), voltages	
• 0 to +5 V	No
• 0 to +10 V	No
• 1 V to 5 V	Yes
— Input resistance (1 V to 5 V)	10 ΜΩ
• -1 V to +1 V	Yes

(4)((-,4))	40.140
— Input resistance (-1 V to +1 V)	10 ΜΩ
• -10 V to +10 V	Yes
— Input resistance (-10 V to +10 V)	10 ΜΩ
• -2.5 V to +2.5 V	No
• -25 mV to +25 mV	No
• -250 mV to +250 mV	No
● -5 V to +5 V	Yes
— Input resistance (-5 V to +5 V)	10 ΜΩ
● -50 mV to +50 mV	Yes
— Input resistance (-50 mV to +50 mV)	10 ΜΩ
● -500 mV to +500 mV	Yes
— Input resistance (-500 mV to +500 mV)	10 ΜΩ
• -80 mV to +80 mV	No
Input ranges (rated values), currents	
• 0 to 20 mA	Yes
— Input resistance (0 to 20 mA)	25 Ω ; Plus approx. 42 ohms for overvoltage protection by PTC
• -20 mA to +20 mA	Yes
— Input resistance (-20 mA to +20 mA)	25 Ω ; Plus approx. 42 ohms for overvoltage protection by PTC
• 4 mA to 20 mA	Yes
— Input resistance (4 mA to 20 mA)	$25~\Omega$; Plus approx. 42 ohms for overvoltage protection by PTC
Input ranges (rated values), thermocouples	
• Type B	No
• Type C	No
● Type E	No
• Type J	No
Type K	No
Type L	No
• Type N	No
■ Type R	No
• Type S	No
Type T	No
Type U	No
Type TXK/TXK(L) to GOST	No
Input ranges (rated values), resistance thermometer	
• Cu 10	No
 Cu 10 according to GOST 	No
● Cu 50	No
 Cu 50 according to GOST 	No
• Cu 100	No
 Cu 100 according to GOST 	No
• Ni 10	No
 Ni 10 according to GOST 	No
• Ni 100	Yes; Standard/climate
— Input resistance (Ni 100)	10 ΜΩ
 Ni 100 according to GOST 	No
• Ni 1000	Yes; Standard/climate
— Input resistance (Ni 1000)	10 ΜΩ
 Ni 1000 according to GOST 	No
• LG-Ni 1000	Yes; Standard/climate
— Input resistance (LG-Ni 1000)	10 ΜΩ
• Ni 120	No
 Ni 120 according to GOST 	No
• Ni 200	No
 Ni 200 according to GOST 	No
• Ni 500	No
 Ni 500 according to GOST 	No
● Pt 10	No
Pt 10 according to GOST	No
• Pt 50	No
Pt 50Pt 50 according to GOST	No No

Innut resistance (Dt 100)	40 MO
— Input resistance (Pt 100)	10 ΜΩ
Pt 100 according to GOST Pt 1000	No Voc. Standard (alimete
• Pt 1000	Yes; Standard/climate
— Input resistance (Pt 1000)	10 ΜΩ
Pt 1000 according to GOST	No
• Pt 200	No
Pt 200 according to GOST	No
• Pt 500	No
Pt 500 according to GOST	No
Input ranges (rated values), resistors	
• 0 to 150 ohms	No
• 0 to 300 ohms	No
• 0 to 600 ohms	Yes
— Input resistance (0 to 600 ohms)	10 ΜΩ
• 0 to 3000 ohms	No
• 0 to 6000 ohms	Yes
— Input resistance (0 to 6000 ohms)	10 ΜΩ
• PTC	Yes
— Input resistance (PTC)	10 ΜΩ
Cable length	
• shielded, max.	200 m; 50 m at 50 mV
Analog value generation for the inputs	
Measurement principle	integrating
Integration and conversion time/resolution per channel	
 Resolution with overrange (bit including sign), max. 	16 bit
 Integration time, parameterizable 	Yes
Integration time (ms)	2,5 / 16,67 / 20 / 100 ms
 Basic conversion time, including integration time (ms) 	10 / 24 / 27 / 107 ms
 additional conversion time for wire-break monitoring 	4 ms (to be considered in R/RTD/U 1 to 5 V measurement)
 additional conversion time for resistance 	8 ms
measurement	
 Interference voltage suppression for interference frequency f1 in Hz 	400 / 60 / 50 / 10 Hz
Smoothing of measured values	
	Yes
parameterizable	Yes
parameterizable Step: None	Yes
parameterizableStep: NoneStep: low	Yes Yes
parameterizableStep: NoneStep: lowStep: Medium	Yes Yes Yes
parameterizableStep: NoneStep: lowStep: MediumStep: High	Yes Yes
 parameterizable Step: None Step: low Step: Medium Step: High Encoder	Yes Yes Yes
 parameterizable Step: None Step: low Step: Medium Step: High Encoder Connection of signal encoders	Yes Yes Yes Yes Yes
 parameterizable Step: None Step: low Step: Medium Step: High Encoder Connection of signal encoders for voltage measurement 	Yes Yes Yes Yes Yes Yes
 parameterizable Step: None Step: low Step: Medium Step: High Encoder Connection of signal encoders for voltage measurement for current measurement as 2-wire transducer 	Yes Yes Yes Yes Yes Yes Yes Yes Yes Yes; with external supply
parameterizable Step: None Step: low Step: Medium Step: High Encoder Connection of signal encoders for voltage measurement for current measurement as 2-wire transducer for current measurement as 4-wire transducer	Yes Yes Yes Yes Yes Yes Yes Yes Yes Yes
parameterizable Step: None Step: low Step: Medium Step: High Encoder Connection of signal encoders for voltage measurement for current measurement as 2-wire transducer for current measurement as 4-wire transducer for resistance measurement with two-wire connection	Yes Yes Yes Yes Yes Yes Yes Yes; with external supply Yes Yes; Only for PTC
parameterizable Step: None Step: low Step: Medium Step: High Encoder Connection of signal encoders for voltage measurement for current measurement as 2-wire transducer for current measurement as 4-wire transducer	Yes Yes Yes Yes Yes Yes Yes Yes; with external supply Yes Yes; Only for PTC Yes; All measuring ranges except PTC; internal compensation of the cable
parameterizable Step: None Step: low Step: Medium Step: High Encoder Connection of signal encoders for voltage measurement for current measurement as 2-wire transducer for current measurement as 4-wire transducer for resistance measurement with two-wire connection for resistance measurement with three-wire connection	Yes Yes Yes Yes Yes Yes Yes Yes; with external supply Yes Yes; Only for PTC
parameterizable Step: None Step: low Step: Medium Step: High Encoder Connection of signal encoders for voltage measurement for current measurement as 2-wire transducer for resistance measurement with two-wire connection for resistance measurement with three-wire connection	Yes Yes Yes Yes Yes Yes Yes Yes; with external supply Yes Yes; Only for PTC Yes; All measuring ranges except PTC; internal compensation of the cable resistances
parameterizable Step: None Step: low Step: Medium Step: High Encoder Connection of signal encoders for voltage measurement for current measurement as 2-wire transducer for current measurement as 4-wire transducer for resistance measurement with two-wire connection for resistance measurement with three-wire connection Frrors/accuracies Linearity error (relative to input range), (+/-)	Yes Yes Yes Yes Yes Yes Yes; with external supply Yes Yes; Only for PTC Yes; All measuring ranges except PTC; internal compensation of the cable resistances 0.1 %
parameterizable Step: None Step: low Step: Medium Step: High Encoder Connection of signal encoders for voltage measurement for current measurement as 2-wire transducer for current measurement as 4-wire transducer for resistance measurement with two-wire connection for resistance measurement with three-wire connection for resistance measurement with three-wire connection Errors/accuracies Linearity error (relative to input range), (+/-) Temperature error (relative to input range), (+/-)	Yes Yes Yes Yes Yes Yes Yes; with external supply Yes Yes; Only for PTC Yes; All measuring ranges except PTC; internal compensation of the cable resistances 0.1 % 0.006 %/K
parameterizable Step: None Step: low Step: Medium Step: High Encoder Connection of signal encoders for voltage measurement for current measurement as 2-wire transducer for current measurement as 4-wire transducer for resistance measurement with two-wire connection for resistance measurement with three-wire connection for resistance measurement with three-wire connection Errors/accuracies Linearity error (relative to input range), (+/-) Temperature error (relative to input range), (+/-) Crosstalk between the inputs, max.	Yes Yes Yes Yes Yes Yes Yes; with external supply Yes Yes; Only for PTC Yes; All measuring ranges except PTC; internal compensation of the cable resistances 0.1 % 0.006 %/K -50 dB
parameterizable Step: None Step: low Step: Medium Step: High Encoder Connection of signal encoders for voltage measurement for current measurement as 2-wire transducer for current measurement as 4-wire transducer for resistance measurement with two-wire connection for resistance measurement with three-wire connection for resistance measurement with three-wire connection Errors/accuracies Linearity error (relative to input range), (+/-) Temperature error (relative to input range), (+/-) Crosstalk between the inputs, max. Repeat accuracy in steady state at 25 °C (relative to input	Yes Yes Yes Yes Yes Yes Yes; with external supply Yes Yes; Only for PTC Yes; All measuring ranges except PTC; internal compensation of the cable resistances 0.1 % 0.006 %/K
parameterizable Step: None Step: low Step: Medium Step: High Encoder Connection of signal encoders for voltage measurement for current measurement as 2-wire transducer for current measurement as 4-wire transducer for resistance measurement with two-wire connection for resistance measurement with three-wire connection Frors/accuracies Linearity error (relative to input range), (+/-) Temperature error (relative to input range), (+/-) Crosstalk between the inputs, max. Repeat accuracy in steady state at 25 °C (relative to input range), (+/-)	Yes Yes Yes Yes Yes Yes Yes; with external supply Yes Yes; Only for PTC Yes; All measuring ranges except PTC; internal compensation of the cable resistances 0.1 % 0.006 %/K -50 dB
parameterizable Step: None Step: low Step: Medium Step: High Encoder Connection of signal encoders for voltage measurement for current measurement as 2-wire transducer for current measurement as 4-wire transducer for resistance measurement with two-wire connection for resistance measurement with three-wire connection for resistance measurement with three-wire connection Errors/accuracies Linearity error (relative to input range), (+/-) Temperature error (relative to input range), (+/-) Crosstalk between the inputs, max. Repeat accuracy in steady state at 25 °C (relative to input range), (+/-) Operational error limit in overall temperature range	Yes Yes Yes Yes Yes Yes; with external supply Yes Yes; Only for PTC Yes; All measuring ranges except PTC; internal compensation of the cable resistances 0.1 % 0.006 %/K -50 dB 0.1 %
 parameterizable Step: None Step: low Step: Medium Step: High Encoder Connection of signal encoders for voltage measurement for current measurement as 2-wire transducer for current measurement as 4-wire transducer for resistance measurement with two-wire connection for resistance measurement with three-wire connection Errors/accuracies Linearity error (relative to input range), (+/-) Temperature error (relative to input range), (+/-) Crosstalk between the inputs, max. Repeat accuracy in steady state at 25 °C (relative to input range), (+/-) Operational error limit in overall temperature range Voltage, relative to input range, (+/-) 	Yes Yes Yes Yes Yes; with external supply Yes Yes; Only for PTC Yes; All measuring ranges except PTC; internal compensation of the cable resistances 0.1 % 0.006 %/K -50 dB 0.1 %
 parameterizable Step: None Step: low Step: Medium Step: High Encoder Connection of signal encoders for voltage measurement for current measurement as 2-wire transducer for current measurement as 4-wire transducer for resistance measurement with two-wire connection for resistance measurement with three-wire connection Errors/accuracies Linearity error (relative to input range), (+/-) Temperature error (relative to input range), (+/-) Crosstalk between the inputs, max. Repeat accuracy in steady state at 25 °C (relative to input range), (+/-) Operational error limit in overall temperature range Voltage, relative to input range, (+/-) Current, relative to input range, (+/-) 	Yes Yes Yes Yes Yes; with external supply Yes Yes; Only for PTC Yes; All measuring ranges except PTC; internal compensation of the cable resistances 0.1 % 0.006 %/K -50 dB 0.1 % 0.5 % 0.5 %
 parameterizable Step: None Step: low Step: High Encoder Connection of signal encoders for voltage measurement for current measurement as 2-wire transducer for current measurement as 4-wire transducer for resistance measurement with two-wire connection for resistance measurement with three-wire connection Errors/accuracies Linearity error (relative to input range), (+/-) Temperature error (relative to input range), (+/-) Crosstalk between the inputs, max. Repeat accuracy in steady state at 25 °C (relative to input range), (+/-) Operational error limit in overall temperature range Voltage, relative to input range, (+/-) Current, relative to input range, (+/-) Resistance, relative to input range, (+/-) 	Yes Yes Yes Yes Yes; with external supply Yes Yes; Only for PTC Yes; All measuring ranges except PTC; internal compensation of the cable resistances 0.1 % 0.006 %/K -50 dB 0.1 % 0.5 % 0.5 % 0.5 %
 parameterizable Step: None Step: low Step: Medium Step: High Encoder Connection of signal encoders for voltage measurement for current measurement as 2-wire transducer for current measurement as 4-wire transducer for resistance measurement with two-wire connection for resistance measurement with three-wire connection Errors/accuracies Linearity error (relative to input range), (+/-) Temperature error (relative to input range), (+/-) Crosstalk between the inputs, max. Repeat accuracy in steady state at 25 °C (relative to input range), (+/-) Operational error limit in overall temperature range Voltage, relative to input range, (+/-) Current, relative to input range, (+/-) 	Yes Yes Yes Yes Yes; with external supply Yes Yes; Only for PTC Yes; All measuring ranges except PTC; internal compensation of the cable resistances 0.1 % 0.006 %/K -50 dB 0.1 % 0.5 % 0.5 %
 parameterizable Step: None Step: low Step: High Encoder Connection of signal encoders for voltage measurement for current measurement as 2-wire transducer for current measurement as 4-wire transducer for resistance measurement with two-wire connection for resistance measurement with three-wire connection Errors/accuracies Linearity error (relative to input range), (+/-) Temperature error (relative to input range), (+/-) Crosstalk between the inputs, max. Repeat accuracy in steady state at 25 °C (relative to input range), (+/-) Operational error limit in overall temperature range Voltage, relative to input range, (+/-) Current, relative to input range, (+/-) Resistance, relative to input range, (+/-) Resistance thermometer, relative to input range, (+/-) 	Yes Yes Yes Yes Yes Yes; with external supply Yes Yes; Only for PTC Yes; All measuring ranges except PTC; internal compensation of the cable resistances 0.1 % 0.006 %/K -50 dB 0.1 % 0.5 % 0.5 % 0.5 % Ptxxx Standard: ±1.2 K, Ptxxx Climate: ±0.8 K, Nixxx Standard: ±0.8 K, Nixxx
 parameterizable Step: None Step: low Step: High Encoder Connection of signal encoders for voltage measurement for current measurement as 2-wire transducer for current measurement as 4-wire transducer for resistance measurement with two-wire connection for resistance measurement with three-wire connection Errors/accuracies Linearity error (relative to input range), (+/-) Temperature error (relative to input range), (+/-) Crosstalk between the inputs, max. Repeat accuracy in steady state at 25 °C (relative to input range), (+/-) Operational error limit in overall temperature range Voltage, relative to input range, (+/-) Current, relative to input range, (+/-) Resistance, relative to input range, (+/-) Resistance thermometer, relative to input range, (+/-) Basic error limit (operational limit at 25 °C)	Yes Yes Yes Yes Yes Yes; with external supply Yes Yes; Only for PTC Yes; All measuring ranges except PTC; internal compensation of the cable resistances 0.1 % 0.006 %/K -50 dB 0.1 % 0.5 % 0.5 % 0.5 % Ptxxx Standard: ±1.2 K, Ptxxx Climate: ±0.8 K, Nixxx Standard: ±0.8 K, Nixxx
 parameterizable Step: None Step: low Step: High Encoder Connection of signal encoders for voltage measurement for current measurement as 2-wire transducer for current measurement as 4-wire transducer for resistance measurement with two-wire connection for resistance measurement with three-wire connection Errors/accuracies Linearity error (relative to input range), (+/-) Temperature error (relative to input range), (+/-) Crosstalk between the inputs, max. Repeat accuracy in steady state at 25 °C (relative to input range), (+/-) Operational error limit in overall temperature range Voltage, relative to input range, (+/-) Current, relative to input range, (+/-) Resistance, relative to input range, (+/-) Resistance thermometer, relative to input range, (+/-) 	Yes Yes Yes Yes Yes Yes; with external supply Yes Yes; Only for PTC Yes; All measuring ranges except PTC; internal compensation of the cable resistances 0.1 % 0.006 %/K -50 dB 0.1 % 0.5 % 0.5 % 0.5 % Ptxxx Standard: ±1.2 K, Ptxxx Climate: ±0.8 K, Nixxx Standard: ±0.8 K, Nixxx Climate: ±0.8 K

 Resistance, relative to input range, (+/-) 	0.3 %
Resistance thermometer, relative to input range, (+/-)	Ptxxx Standard: ±1.0 K, Ptxxx Climate: ±0.5 K, Nixxx Standard: ±0.5 K, Nixxx Climate: ±0.5 K
Interference voltage suppression for f = n x (f1 +/- 1 %), f1 = interference	erence frequency
 Series mode interference (peak value of interference < rated value of input range), min. 	40 dB
 Common mode voltage, max. 	4 V
 Common mode interference, min. 	60 dB
Interrupts/diagnostics/status information	
Diagnostics function	Yes
Alarms	
Diagnostic alarm	Yes
Limit value alarm	Yes; two upper and two lower limit values in each case
Diagnoses	
Monitoring the supply voltage	No
Wire-break	Yes; Only for 1 5 V, 4 20 mA, R, and RTD
Short-circuit	No
	No
Group error Overflow/underflow	Yes
	1 03
Diagnostics indication LED	Yes; green LED
• RUN LED	
• ERROR LED	Yes; red LED
• MAINT LED	No
 Monitoring of the supply voltage (PWR-LED) 	No
Channel status display	Yes; green LED
 for channel diagnostics 	Yes; red LED
for module diagnostics	Yes; red LED
Potential separation	
Potential separation channels	
 between the channels 	No
 between the channels, in groups of 	8
 between the channels and backplane bus 	Yes
Permissible potential difference	
between the inputs (UCM)	8 V DC
Between the inputs and MANA (UCM)	4 V DC
Isolation	
Isolation tested with	707 V DC (type test)
product functions / security / header	
signed firmware update	No
data integrity	No
Ambient conditions	
Ambient temperature during operation	
horizontal installation, min.	-30 °C; From FS05
horizontal installation, max.	60 °C
vertical installation, min.	-30 °C; From FS05
vertical installation, min. vertical installation, max.	40 °C
Altitude during operation relating to sea level	
· · · · · · · · · · · · · · · · · · ·	5 000 m; Pactrictions for installation altitudes > 2 000 m, ass manual
Installation altitude above sea level, max. Dimensions	5 000 m; Restrictions for installation altitudes > 2 000 m, see manual
Dimensions	25
Width	35 mm
Height	147 mm
Depth	129 mm
Weights	
Weight, approx.	250 g
last modified:	4/25/2024 🗗

SIEMENS

Data sheet 6ES7531-7TF00-0AB0



SIMATIC S7-1500, analog input module AI 8xHART HF, accuracy 0.1%, 8 channels in groups of 4, common mode voltage: 30 V AC/60 V DC, diagnostics; hardware interrupts calibrate in RUN; delivery including infeed element, shielding bracket and shield terminal

Product type designation	General information	General information	
Firmware version V1.0.0 • FW update possible Yes Product function • I&M data Yes; I&M0 to I&M3 • Isochronous mode No • Prioritized startup No • Scalable measured values No • Scalable measured values No • Scalable measured values No • STEP 7 TIA Portal configurable/integrated from version • STEP 7 TIA Portal configurable/integrated from version • STEP 7 TOME SD version/GSD revision V1.0 / V5.1 • PROFIBUS from GSD version/GSD revision V2.42 /- Operating mode • Oversampling No • MSI Yes CIR - Configuration in RUN Reparameterization possible in RUN Yes Calibration possible in RUN Yes Calibration possible in RUN Yes Calibration possible in RUN Yes Supply voltage Rated value (CC) 24 V permissible range, lower limit (DC) 19.2 V permissible range, lower limit (DC) 28.8 V Reverse polarity protection Yes Input current Current consumption, max. 163 mA Encoder supply 24 V encoder supply 24 V encoder supply 24 V encoder supply 25 Nort-circuit protection Yes Power loss Power available from the backplane bus 1.15 W Power loss Power loss, Vp. 1.8 W Analog linputs	Product type designation	AI 8xHART HF	
Product function RM data	HW functional status	From FS01	
Product function I&M data	Firmware version	V1.0.0	
I I I I I I I I I I I I I I I I I I I	FW update possible	Yes	
• Isochronous mode • Prioritized startup • Measuring range scalable • Scalable measured values • Adjustment of measuring range • No • Engineering with • STEP 7 TIA Portal configurable/integrated from version • PROFIBUS from GSD version/GSD revision • Prograting mode • Oversampling • MSI • Yes CiR - Configuration in RUN Reparameterization possible in RUN • Yes Calibration possible in RUN • Yes Supply voltage Rated value (DC) • 24 V permissible range, lower limit (DC) • 24 V permissible range, lower limit (DC) • 28 8 V Reverse polarity protection • Yes Input current Current consumption, max. • 163 mA Encoder supply • Short-circuit protection • Output current, max. • 20 mA; Max. 47 mA per channel for a duration < 10 s Power loss Power loss • Power loss • Power loss, typ. Analog inputs	Product function		
Prioritized startup Measuring range scalable Scalable measured values Adjustment of measuring range No Engineering with STEP 7 TIA Portal configurable/integrated from version STEP 7 TiA Portal configurable/integrated from version PROFIBUS from GSD version/GSD revision PROFIBUS from GSD version/GSD revision PROFINET from GSD version/GSD revision Operating mode Oversampling MSI CIR-Configuration in RUN Reparameterization possible in RUN Pes Supply voltage Rated value (DC) Permissible range, lower limit (DC) Permissible range, upper limit (DC) Permissible range, u	• I&M data	Yes; I&M0 to I&M3	
Measuring range scalable Scalable measured values Adjustment of measuring range Engineering with STEP 7 TIA Portal configurable/integrated from version STEP 7 Ton Sigurable/integrated from version PROFIBUS from GSD version/GSD revision PROFIBUS from GSD version/GSD revision Operating mode Oversampling MSI CIR- Configuration in RUN Reparameterization possible in RUN Yes Calibration possible in RUN Supply voltage Rated value (DC) permissible range, lower limit (DC) permissible range, upper limit (DC) Permissible range, upper limit (DC) Pressere polarity protection Prover to consumption, max. 163 mA Encodor supply Short-circuit protection Power Power loss Power loss Power loss Power loss Power loss Power loss, typ. Analog inputs	 Isochronous mode 	No	
Scalable measured values Adjustment of measuring range No No STEP 7 TIA Portal configurable/integrated from version STEP 7 Ton Fortal configurable/integrated from version STEP 7 tonfigurable/integrated from version PROFIBUS from GSD version/GSD revision Operating mode Oversampling No MSI STEP 7 ton GSD version/GSD revision Press STEP 7 ton GSD version/GSD revision V2.42 /- Operating mode Oversampling No STEP 7 ton GSD version/GSD revision V2.42 /- Operating mode Oversampling No STEP 7 ton GSD version/GSD revision V2.42 /- Operating mode Oversampling No STEP 7 ton GSD version/GSD revision V2.42 /- Operating mode Oversampling No STEP 7 ton GSD version/GSD revision V2.42 /- Operating mode Oversampling V2.42 /- Oversampling V4 Vess Supply voltage Rated value (DC) Permissible range, lower limit (DC) Permissible range, upper limit (DC) Permissible range, upper limit (DC) Permissible range, upper limit (DC) Permissible range, lower limit (DC) Permissible range, upper limit (D	 Prioritized startup 	No	
• Adjustment of measuring range Engineering with • STEP 7 TIA Portal configurable/integrated from version • STEP 7 configurable/integrated from version • STEP 7 configurable/integrated from version • PROFIBUS from GSD version/GSD revision • PROFINET from GSD version/GSD revision • PROFINET from GSD version/GSD revision • Oversampling • MSI • MSI Reparameterization possible in RUN Reparameterization possible in RUN Reparameterization possible in RUN Reparameterization possible in RUN Rated value (DC) permissible range, lower limit (DC) permissible range, lower limit (DC) permissible range, upper limit (DC) AReverse polarity protection input current Current consumption, max. 163 mA Encoder supply • Short-circuit protection • Output current, max. 20 mA; Max. 47 mA per channel for a duration < 10 s Power Power available from the backplane bus 1.15 W Power loss, typ. Analog inputs	 Measuring range scalable 	No	
Engineering with STEP 7 TIA Portal configurable/integrated from version STEP 7 configurable/integrated from version PROFIBUS from GSD version/GSD revision PROFIBUS from GSD version/GSD revision PROFINET from GSD version/GSD revision Pres Operating mode Oversampling No MSI Yes CIR-Configuration in RUN Reparameterization possible in RUN Yes Calibration possible in RUN Yes Supply voltage Rated value (DC) Permissible range, upper limit (DC) Pres Input current Current consumption, max. 163 mA Encoder supply Short-circuit protection Yes Output current, max. 20 mA; Max. 47 mA per channel for a duration < 10 s Power Power available from the backplane bus Power loss Power loss Power loss, typ. 1.8 W Analog inputs	 Scalable measured values 	No	
STEP 7 TIA Portal configurable/integrated from version STEP 7 configurable/integrated from version PROFIBUS from GSD version/GSD revision PROFIBUS from GSD version/GSD revision PROFINET from GSD version/GSD revision PROFINET from GSD version/GSD revision V2.42 /- Operating mode Oversampling No MSI Yes CIR - Configuration in RUN Reparameterization possible in RUN Yes Calibration possible in RUN Yes Supply voltage Rated value (DC) Permissible range, lower limit (DC) Permissible range, upper limit (DC) Permissible range, upper limit (DC) Reverse polarity protection Yes Input current Current consumption, max. 163 mA Encoder supply 24 V encoder supply Supply Supply version Power ross Power Poss Power loss loss page were less loss page to vision vision loss loss page to vision loss page to vision loss loss page to vision los vision loss page to vision loss page to vision loss	Adjustment of measuring range	No	
STEP 7 configurable/integrated from version PROFIBUS from GSD version/GSD revision PROFIBUS from GSD version/GSD revision V2.42 / - Operating mode Oversampling No MSI Yes CIR - Configuration in RUN Reparameterization possible in RUN Yes Calibration possible in RUN Yes Supply voltage Rated value (DC) Permissible range, lower limit (DC) Permissible range, upper limit (DC) Permissible range, upper limit (DC) Reverse polarity protection Ves Input current Current consumption, max. Encoder supply 4 V encoder supply Short-circuit protection Yes Output current, max. Power Power available from the backplane bus Power loss Power loss, typ. 1.8 W Analog inputs	Engineering with		
PROFIBUS from GSD version/GSD revision PROFINET from GSD version/GSD revision V2.42 / - Operating mode Oversampling MSI Pes CIR - Configuration in RUN Reparameterization possible in RUN Yes Calibration possible in RUN Supply voltage Rated value (DC) permissible range, lower limit (DC) permissible range, upper limit (DC) permissible range, upper limit (DC) Reverse polarity protection Input current Current consumption, max. 163 mA Encoder supply 24 V encoder supply 9 Short-circuit protection Yes Output current, max. 20 mA; Max. 47 mA per channel for a duration < 10 s Power Power available from the backplane bus Power loss Power loss Power loss, typ. 1.8 W Analog inputs	 STEP 7 TIA Portal configurable/integrated from version 	V17/V18 with HSP 383	
PROFINET from GSD version/GSD revision Operating mode Oversampling No MSI Yes CiR - Configuration in RUN Reparameterization possible in RUN Calibration possible in RUN Yes Supply voltage Rated value (DC) 24 V permissible range, lower limit (DC) 19.2 V permissible range, upper limit (DC) 28.8 V Reverse polarity protection Yes Current consumption, max. Input current Current consumption, max. Encoder supply 24 V encoder supply • Short-circuit protection • Output current, max. Power Power available from the backplane bus 1.15 W Power loss Power loss, typ. Analog inputs No Yes No Yes 1.8 W Analog inputs	 STEP 7 configurable/integrated from version 	V5.5 SP3 / -	
Operating mode Oversampling No MSI Yes CIR - Configuration in RUN Reparameterization possible in RUN Reparameterization possible in RUN Yes Calibration possible in RUN Yes Supply voltage Rated value (DC) permissible range, lower limit (DC) permissible range, upper limit (DC) permissible range, upper limit (DC) Reverse polarity protection Yes Input current Current consumption, max. 163 mA Encoder supply 4 Vencoder supply • Short-circuit protection • Output current, max. 20 mA; Max. 47 mA per channel for a duration < 10 s Power Power available from the backplane bus 1.15 W Power loss Power loss, typ. Analog inputs	 PROFIBUS from GSD version/GSD revision 	V1.0 / V5.1	
Oversampling MSI Yes CIR - Configuration in RUN Reparameterization possible in RUN Yes Calibration possible in RUN Yes Supply voltage Rated value (DC) permissible range, lower limit (DC) permissible range, upper limit (DC) permissible range, upper limit (DC) Reverse polarity protection Yes Input current Current consumption, max. 163 mA Encoder supply 4 V encoder supply • Short-circuit protection Yes • Output current, max. 20 mA; Max. 47 mA per channel for a duration < 10 s Power Power available from the backplane bus Power loss Power loss Power loss, typ. Analog inputs	PROFINET from GSD version/GSD revision	V2.42 / -	
NSI CiR - Configuration in RUN Reparameterization possible in RUN Yes Calibration possible in RUN Yes Supply voltage Rated value (DC) Permissible range, lower limit (DC) Permissible range, upper limit	Operating mode		
CiR - Configuration in RUN Reparameterization possible in RUN Yes Supply voltage Rated value (DC) permissible range, lower limit (DC) permissible range, upper limit (DC) permissible range, upper limit (DC) Reverse polarity protection Yes Input current Current consumption, max. 163 mA Encoder supply 4 V encoder supply • Short-circuit protection Yes • Output current, max. 20 mA; Max. 47 mA per channel for a duration < 10 s Power Power available from the backplane bus 1.15 W Power loss Power loss, typ. Analog inputs	 Oversampling 	No	
Reparameterization possible in RUN Calibration possible in RUN Yes Supply voltage Rated value (DC) permissible range, lower limit (DC) permissible range, upper limit (DC) Reverse polarity protection Yes Input current Current consumption, max. Encoder supply 24 V encoder supply 4 V encoder supply • Short-circuit protection Yes Output current, max. 20 mA; Max. 47 mA per channel for a duration < 10 s Power Power available from the backplane bus Power loss Power loss, typ. Analog inputs	• MSI	Yes	
Calibration possible in RUN Supply voltage Rated value (DC) permissible range, lower limit (DC) permissible range, upper limit (DC) Reverse polarity protection Yes Input current Current consumption, max. 163 mA Encoder supply 24 V encoder supply • Short-circuit protection Yes • Output current, max. Power Power available from the backplane bus Power loss, typ. Analog inputs	CiR - Configuration in RUN		
Rated value (DC) permissible range, lower limit (DC) permissible range, upper limit (DC) Reverse polarity protection Fourier consumption, max. Current consumption, max. 163 mA Current consumption, max. 163 mA Current consumption, max. 24 V encoder supply 24 V encoder supply 9 Short-circuit protection Yes Output current, max. 20 mA; Max. 47 mA per channel for a duration < 10 s Power Power available from the backplane bus 1.15 W Power loss Power loss, typ. 1.8 W Analog inputs	Reparameterization possible in RUN	Yes	
Rated value (DC) permissible range, lower limit (DC) permissible range, upper limit (DC) Reverse polarity protection Yes Input current Current consumption, max. 163 mA Encoder supply 24 V encoder supply 9 Short-circuit protection Output current, max. 20 mA; Max. 47 mA per channel for a duration < 10 s Power Power available from the backplane bus 1.15 W Power loss, typ. 1.8 W Analog inputs	Calibration possible in RUN	Yes	
permissible range, lower limit (DC) permissible range, upper limit (DC) Reverse polarity protection Reverse polarity protection Yes Input current Current consumption, max. 163 mA Encoder supply 24 V encoder supply • Short-circuit protection • Output current, max. 20 mA; Max. 47 mA per channel for a duration < 10 s Power Power available from the backplane bus 1.15 W Power loss Power loss, typ. 1.8 W Analog inputs	Supply voltage		
permissible range, upper limit (DC) Reverse polarity protection Yes Input current Current consumption, max. 163 mA Encoder supply 24 V encoder supply • Short-circuit protection • Output current, max. Power Power available from the backplane bus Power loss Power loss, typ. 1.8 W Analog inputs	Rated value (DC)	24 V	
Reverse polarity protection Input current Current consumption, max. Encoder supply 24 V encoder supply • Short-circuit protection • Output current, max. Power Power available from the backplane bus Power loss Power loss, typ. Analog inputs	permissible range, lower limit (DC)	19.2 V	
Input current Current consumption, max. Encoder supply 24 V encoder supply Short-circuit protection Output current, max. Power Power available from the backplane bus Power loss Power loss, typ. Analog inputs	permissible range, upper limit (DC)	28.8 V	
Current consumption, max. Encoder supply 24 V encoder supply Short-circuit protection Output current, max. Power Power available from the backplane bus Power loss Power loss, typ. Analog inputs	Reverse polarity protection	Yes	
Encoder supply 24 V encoder supply Short-circuit protection Output current, max. Power Power available from the backplane bus Power loss Power loss, typ. 1.8 W Analog inputs	Input current		
24 V encoder supply Short-circuit protection Output current, max. Power Power available from the backplane bus Power loss Power loss, typ. Analog inputs	Current consumption, max.	163 mA	
Short-circuit protection Output current, max. Power Power available from the backplane bus 1.15 W Power loss Power loss, typ. 1.8 W Analog inputs	Encoder supply		
● Output current, max. 20 mA; Max. 47 mA per channel for a duration < 10 s Power Power available from the backplane bus 1.15 W Power loss Power loss, typ. 1.8 W Analog inputs	24 V encoder supply		
Power available from the backplane bus 1.15 W Power loss Power loss, typ. 1.8 W Analog inputs	Short-circuit protection	Yes	
Power available from the backplane bus 1.15 W Power loss Power loss, typ. 1.8 W Analog inputs	Output current, max.	20 mA; Max. 47 mA per channel for a duration < 10 s	
Power loss Power loss, typ. 1.8 W Analog inputs	Power		
Power loss, typ. 1.8 W Analog inputs	Power available from the backplane bus	1.15 W	
Analog inputs	Power loss		
Analog inputs	Power loss, typ.	1.8 W	
		8	

For current measurement	8
permissible input current for current input (destruction limit),	40 mA
max.	
Input ranges (rated values), currents	
• 0 to 20 mA	Yes
— Input resistance (0 to 20 mA)	125 Ω
• -20 mA to +20 mA	Yes
— Input resistance (-20 mA to +20 mA)	125 Ω
• 4 mA to 20 mA	Yes
— Input resistance (4 mA to 20 mA)	125 Ω; plus approx. 17 Ohm when using the switch against M
Cable length	
shielded, max.	800 m
Analog value generation for the inputs	
Measurement principle	integrating (Sigma-Delta)
Integration and conversion time/resolution per channel	
Resolution with overrange (bit including sign), max.	16 bit
Integration time, parameterizable	Yes
• Integration time (ms)	Fast mode: 2.5 / 16.67 / 20 / 100 ms, standard mode: 7.5 / 50 / 60 / 300 ms
Basic conversion time, including integration time (ms)	Fast Mode: 7 / 22 / 25 / 106 ms; Standard Mode: 12 / 55 / 65 / 308 ms
Interference voltage suppression for interference	10 / 50 / 60 / 400 Hz
frequency f1 in Hz	10 / 50 / 50 / 700 12
Basic execution time of the module (all channels released)	channel 0 and 4, 1 and 5, etc. measure in pairs simultaneously. The slower channel of each pair determines the basic execution time of the channel pair. The basic execution time of the module is calculated by adding the basic conversion times of the channel pairs.
Smoothing of measured values	
parameterizable	Yes
Step: None	Yes
• Step: low	Yes
Step: Medium	Yes
Step: High	Yes
Encoder	
Connection of signal encoders	
for voltage measurement	No
for current measurement as 2-wire transducer	Yes
— Burden of 2-wire transmitter, max.	820 Ω; at 24 V input voltage
for current measurement as 4-wire transducer	Yes
for resistance measurement with two-wire connection	No
for resistance measurement with three-wire connection	No
for resistance measurement with four-wire connection	No
Errors/accuracies	INO
	0.02 %
Linearity error (relative to input range), (+/-) Temperature error (relative to input range), (+/-)	0.005 %/K
Crosstalk between the inputs, max.	-80 dB 0.02 %
Repeat accuracy in steady state at 25 °C (relative to input range), (+/-)	U.UZ /0
note regarding accuracy	at temperatures below 0 °C, the figures for operating error and temperature error are doubled
Operational error limit in overall temperature range	
• Current, relative to input range, (+/-)	0.1 %; without HART communication
Basic error limit (operational limit at 25 °C)	
• Current, relative to input range, (+/-)	0.05 %; without HART communication
Influence of a HART signal modulated on the input signal in relation	n to input range
• error occurred at interference frequency suppression: 400 Hz	0.19 %; in the Standard operating mode, 0.55 % in the Fast operating mode
 error occurred at interference frequency suppression: 60 Hz 	0.05 %; in the Standard operating mode, 0.1 % in the Fast operating mode
 error occurred at interference frequency suppression: 50 Hz 	0.04 %; in the Standard operating mode, 0.09 % in the Fast operating mode
error occurred at interference frequency suppression: 10 Hz	0.02 %; in the Standard operating mode, 0.03 % in the Fast operating mode
Interference voltage suppression for f = n x (f1 +/- 1 %), f1 = interfe	
 Series mode interference (peak value of interference < rated value of input range), min. 	80 dB; in the Standard operating mode, 40 dB in the Fast operating mode

 Common mode voltage, max. 	60 V DC/30 V AC
Common mode interference, min.	80 dB
Interrupts/diagnostics/status information	
Diagnostics function	Yes
Alarms	
Diagnostic alarm	Yes
Limit value alarm	Yes; two upper and two lower limit values in each case
Diagnoses	
 Monitoring the supply voltage 	Yes
Wire-break	Yes; With 4 mA to 20 mA, channel by channel
Overflow/underflow	Yes
Diagnostics indication LED	
• RUN LED	Yes; green LED
• ERROR LED	Yes; red LED
 Monitoring of the supply voltage (PWR-LED) 	Yes; green LED
 Channel status display 	Yes; green LED
 for channel diagnostics 	Yes; red LED
• for module diagnostics	Yes; red LED
Potential separation	
Potential separation analog inputs	
between the channels	No; however, increased permissible potential difference between the inputs.
 between the channels, in groups of 	8
 between the channels and backplane bus 	Yes
between the channels and the power supply of the	No
electronics	
Potential separation channels	Ma
between the channels	No
between the channels and backplane bus	Yes
between the channels and the power supply of the electronics	No
Permissible potential difference	
between different circuits	60 V DC/30 V AC
between the inputs (UCM)	60 V DC/30 V AC
Isolation	
Isolation tested with	707 V DC (type test)
product functions / security / header	
signed firmware update	No
data integrity	No
Ambient conditions	
Ambient temperature during operation	
 horizontal installation, min. 	-30 °C
 horizontal installation, max. 	60 °C
 vertical installation, min. 	-30 °C
vertical installation, max.	40 °C
Altitude during operation relating to sea level	
 Installation altitude above sea level, max. 	5 000 m; Restrictions for installation altitudes > 2 000 m, see manual
Dimensions	
Width	35 mm
Height	147 mm
Depth	129 mm
Weights	
Weight, approx.	270 g