Data sheet 6ES7314-6BH04-0AB0



SIMATIC S7-300, CPU 314C-2 PTP Compact CPU with MPI, 24 DI/16 DO, 4 AI, 2 AO, 1 Pt100, 4 high-speed counters (60 kHz), integrated interface RS485, Integr. power supply 24 V DC, work memory 192 KB, Front connector (2x 40-pole) and Micro Memory Card required

General information	
HW functional status	01
Firmware version	V3.3
Engineering with	
Programming package	STEP 7 as of V5.5 + SP1 or STEP 7 V5.3 + SP2 or higher with HSP 204
Supply voltage	
Rated value (DC)	24 V
permissible range, lower limit (DC)	19.2 V
permissible range, upper limit (DC)	28.8 V
external protection for power supply lines (recommendation)	Miniature circuit breaker, type C; min. 2 A; miniature circuit breaker type B, min. 4 A
Mains buffering	
 Mains/voltage failure stored energy time 	5 ms
Repeat rate, min.	1 s
Load voltage L+	
Digital inputs	
— load voltage / at digital input / at DC / rated value	24 V
 Reverse polarity protection 	Yes
Digital outputs	
— Rated value (DC)	24 V
 Reverse polarity protection 	No
Input current	
Current consumption (rated value)	660 mA
Current consumption (in no-load operation), typ.	150 mA
Inrush current, typ.	5 A
l²t	0.7 A ² ·s
Digital inputs	
 from load voltage L+ (without load), max. 	80 mA
Digital outputs	
• from load voltage L+, max.	50 mA
Power loss	
Power loss, typ.	13 W
Memory	
Work memory	
• integrated	192 kbyte
expandable	No
Load memory	
• Plug-in (MMC)	Yes
Plug-in (MMC), max.	8 Mbyte
 Data management on MMC (after last programming), min. 	10 a

Backup	
• present	Yes; Guaranteed by MMC (maintenance-free)
without battery	Yes; Program and data
CPU processing times	
for bit operations, typ.	0.06 µs
for word operations, typ.	0.12 μs
for fixed point arithmetic, typ.	0.16 μs
for floating point arithmetic, typ.	0.59 µs
CPU-blocks	V.50 p.C
Number of blocks (total)	1 024; (DBs, FCs, FBs); the maximum number of loadable blocks can be
Transcr of brooks (total)	reduced by the MMC used.
DB	
 Number, max. 	1 024; Number range: 1 to 16000
• Size, max.	64 kbyte
FB	
Number, max.	1 024; Number range: 0 to 7999
• Size, max.	64 kbyte
FC	
Number, max.	1 024; Number range: 0 to 7999
• Size, max.	64 kbyte
OB	
Number, max.	see instruction list
• Size, max.	64 kbyte
Number of free cycle OBs	1; OB 1
Number of time alarm OBs	1; OB 10
 Number of delay alarm OBs 	2; OB 20, 21
 Number of cyclic interrupt OBs 	4; OB 32, 33, 34, 35
 Number of process alarm OBs 	1; OB 40
 Number of startup OBs 	1; OB 100
 Number of asynchronous error OBs 	4; OB 80, 82, 85, 87
Number of synchronous error OBs	2; OB 121, 122
Nesting depth	
 per priority class 	16
additional within an error OB	4
Counters, timers and their retentivity	
S7 counter	
Number	256
Retentivity	
— adjustable	Yes
— preset	Z 0 to Z 7
Counting range	
Counting range — lower limit	0
Counting range — lower limit — upper limit	
Counting range — lower limit — upper limit IEC counter	0 999
Counting range — lower limit — upper limit IEC counter • present	0 999 Yes
Counting range — lower limit — upper limit IEC counter • present • Type	0 999 Yes SFB
Counting range — lower limit — upper limit IEC counter • present • Type • Number	0 999 Yes
Counting range — lower limit — upper limit IEC counter • present • Type • Number \$7 times	0 999 Yes SFB Unlimited (limited only by RAM capacity)
Counting range — lower limit — upper limit IEC counter • present • Type • Number S7 times • Number	0 999 Yes SFB
Counting range — lower limit — upper limit IEC counter • present • Type • Number \$7 times • Number Retentivity	0 999 Yes SFB Unlimited (limited only by RAM capacity)
Counting range — lower limit — upper limit IEC counter • present • Type • Number S7 times • Number Retentivity — adjustable	0 999 Yes SFB Unlimited (limited only by RAM capacity) 256 Yes
Counting range — lower limit — upper limit IEC counter • present • Type • Number S7 times • Number Retentivity — adjustable — preset	0 999 Yes SFB Unlimited (limited only by RAM capacity)
Counting range — lower limit — upper limit IEC counter • present • Type • Number S7 times • Number Retentivity — adjustable — preset Time range	0 999 Yes SFB Unlimited (limited only by RAM capacity) 256 Yes No retentivity
Counting range — lower limit — upper limit IEC counter • present • Type • Number S7 times • Number Retentivity — adjustable — preset Time range — lower limit	O 999 Yes SFB Unlimited (limited only by RAM capacity) 256 Yes No retentivity 10 ms
Counting range — lower limit — upper limit IEC counter • present • Type • Number S7 times • Number Retentivity — adjustable — preset Time range — lower limit — upper limit	0 999 Yes SFB Unlimited (limited only by RAM capacity) 256 Yes No retentivity
Counting range — lower limit — upper limit IEC counter • present • Type • Number S7 times • Number Retentivity — adjustable — preset Time range — lower limit — upper limit IEC timer	O 9999 Yes SFB Unlimited (limited only by RAM capacity) 256 Yes No retentivity 10 ms 9 990 s
Counting range — lower limit — upper limit IEC counter • present • Type • Number S7 times • Number Retentivity — adjustable — preset Time range — lower limit — upper limit IEC timer • present	O 999 Yes SFB Unlimited (limited only by RAM capacity) 256 Yes No retentivity 10 ms 9 990 s Yes
Counting range — lower limit — upper limit IEC counter • present • Type • Number S7 times • Number Retentivity — adjustable — preset Time range — lower limit — upper limit IEC timer • present • Type	0 999 Yes SFB Unlimited (limited only by RAM capacity) 256 Yes No retentivity 10 ms 9 990 s Yes SFB
Counting range — lower limit — upper limit IEC counter • present • Type • Number S7 times • Number Retentivity — adjustable — preset Time range — lower limit — upper limit IEC timer • present	O 999 Yes SFB Unlimited (limited only by RAM capacity) 256 Yes No retentivity 10 ms 9 990 s Yes

Flan	
Flag ◆ Size, max.	256 byte
Retentivity available	Yes; MB 0 to MB 255
•	
Retentivity preset	MB 0 to MB 15
Number of clock memories	8; 1 memory byte
Data blocks	
Retentivity adjustable	Yes; via non-retain property on DB
Retentivity preset	Yes
Local data	
per priority class, max.	32 kbyte; Max. 2048 bytes per block
Address area	
I/O address area	
• Inputs	1 024 byte
Outputs	1 024 byte
of which distributed	
— Inputs	none
— Outputs	none
Process image	
• Inputs	1 024 byte
Outputs	1 024 byte
Inputs, adjustable	1 024 byte
Outputs, adjustable	1 024 byte
• Inputs, default	128 byte
Outputs, default	128 byte
Default addresses of the integrated channels	
— Digital inputs	124.0 to 126.7
— Digital outputs	124.0 to 125.7
— Analog inputs	752 to 761
	752 to 755
— Analog outputs	752 to 755
Digital channels	4.046
• Inputs	1 016
— of which central	1 016
Outputs	1 008
— of which central	1 008
Analog channels	
• Inputs	253
— of which central	253
Outputs	250
— of which central	250
Hardware configuration	
Number of expansion units, max.	3
Number of DP masters	
• integrated	none
• via CP	4
Number of operable FMs and CPs (recommended)	
• FM	8
• CP, PtP	8
• CP, LAN	10
Rack	
• Racks, max.	4
Modules per rack, max.	8; In rack 3 max. 7
Time of day	
Clock	
	Vac
Hardware clock (real-time) retenting and symphospicable	Yes
retentive and synchronizable	Yes
Backup time	6 wk; At 40 °C ambient temperature
 Deviation per day, max. 	10 s; Typ.: 2 s
Behavior of the clock following POWER-ON	Clock continues running after POWER OFF

Number Number range Number range Range of values Granularity Granularity Retentive Person Williams Supported No MPI, device In AS, device No Digital inputs Of which inputs uable for technological functions Integrated channels (DI) Input characteristic curve in accordance with IEC 61131, type 1 Number of simultaneously controllable inputs Northoral installation - up to 40 °C, max up to 60 °C, max. Input object of signal "1", typ. Input characteristic curve For signal "1", typ. Input device of the control of the c	
• Range of values • Cranularity • retentive • Cranularity • retentive Clock synchronization • supported • to MPI, master • on MPI, device • in AS, master • in AS, device • in AS, device • in AS, device • in AS, master • on MPI, device, and the master • in AS, device • in AS, master • on MPI, device • in AS, master • in AS, device • in AS, master • on MPI, device • in AS, master • in AS, device • in AS, master • of vigital inputs Number of digital inputs • of which inputs usable for technological functions integrated channels (DI) Input characteristic curve in accordance with IEC 61131, type 1 Number of simultaneously controllable inputs horizontal installation • up to 40 °C, max. 24 • up to 60 °C, max. 12 vertical installation • up to 40 °C, max. 12 vertical installation • up to 40 °C, max. 12 input oldage • Rated value (DC) • for signal "1" • for signal "1", typ. Input delay (for rated value of input voltage) for standard inputs • parameterizable • parameterizable of retenhological functions • at "0" to "1", max. Cable length • shielded, max. • unshielded, max. ounshielded, max. - unshielded, max.	
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Clock synchronization • supported • to MPI, master • to MPI, device • in AS, master • in AS, device • in AS, device • in AS, device • in AS, device • in AS, device • in AS, device • in AS, device • in AS, device • in AS, device • in AS, device • in AS, device • in AS, device • in AS, device • of which inputs usable for technological functions • 16 • integrated channels (DI) • Input characteristic curve in accordance with IEC 61131, type 1 • Number of simultaneously controllable inputs • Normore of simultaneously controllable inputs • Normore of simultaneously controllable inputs • Input characteristic curve in accordance with IEC 61131, type 1 • Number of simultaneously controllable inputs • Input of 0° C, max. • up to 60° C, max. • up to 60° C, max. • up to 60° C, max. • 12 • Input voltage • Rated value (DC) • for signal "0° • 3 to +5V • for signal "1" • 15 to +30 V • Input current • for signal "1", typ. • 8 mA Input delay (for rated value of input voltage) for standard inputs — parameterizable • Rated value • ARated value • The signal "1", max. • unshielded, max. • unshielded of input voltage) • Rate value of the technological functions of the t	
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Digital inputs Number of digital inputs 24 ● of which inputs usable for technological functions 16 integrated channels (DI) 24 Input characteristic curve in accordance with IEC 61131, type 1 Yes Number of simultaneously controllable inputs Norizontal installation — up to 40 °C, max. 12 vertical installation 12 — up to 40 °C, max. 12 Input voltage 8 • Rated value (DC) 24 V • for signal "0" -3 to +5V • for signal "1", typ. 8 mA Input delay (for rated value of input voltage) 8 mA Input delay (for rated value of input voltage) 7es; 0.1 / 0.3 / 3 / 15 ms (You can reconfigure the input delay of the sinputs during program runtime. Please note that under certain circums your newly set filter time may not be effective until the next filter cycle 3 ms — Rated value 3 ms for technological functions 8 μs; Minimum pulse width/minimum pause between pulses at maxim counting frequency Cable length • shielded, max. 600 m; for technological functions. No • shielded, max. 600 m; for technological functions. No • shielded, max. 50 m; at maximum count frequenc	
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— unshielded, max. not allowed Digital outputs Number of digital outputs 16	
Digital outputs Number of digital outputs 16	
Number of digital outputs 16	
 of which high-speed outputs 4: Notice: You cannot connect the fast outputs of your CPLL in parallel 	
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integrated channels (DO) 16	
Short-circuit protection Yes; Clocked electronically	
• Response threshold, typ. 1 A	
Limitation of inductive shutdown voltage to L+ (-48 V)	
Controlling a digital input Yes	
Switching capacity of the outputs	
• on lamp load, max. 5 W	
Load resistance range	
• lower limit 48 Ω	
• upper limit 4 kΩ	
Output voltage	
● for signal "1", min. L+ (-0.8 V)	
Output current	
• for signal "1" rated value 500 mA	
• for signal "1" permissible range, min. 5 mA	

for circul 11411 pormionible record many	0.0 4
• for signal "1" permissible range, max.	0.6 A
for signal "1" minimum load current for signal "0" residual current, required	5 mA
• for signal "0" residual current, max.	0.5 mA
Parallel switching of two outputs	No
for upratingfor redundant control of a load	Yes
Switching frequency	165
with resistive load, max.	100 Hz
with resistive load, max. with inductive load, max.	0.5 Hz
on lamp load, max.	100 Hz
of the pulse outputs, with resistive load, max.	2.5 kHz
Total current of the outputs (per group)	2.0 M (2
horizontal installation	
— up to 40 °C, max.	3 A
— up to 60 °C, max.	2 A
vertical installation	
— up to 40 °C, max.	2 A
Cable length	
shielded, max.	1 000 m
• unshielded, max.	600 m
Analog inputs	
Number of analog inputs	5
For voltage/current measurement	4
For resistance/resistance thermometer measurement	1
integrated channels (AI)	5; 4x current/voltage, 1x resistance
permissible input voltage for current input (destruction limit), max.	5 V; Permanent
permissible input voltage for voltage input (destruction limit), max.	30 V; Permanent
permissible input current for voltage input (destruction limit), max.	0.5 mA; Permanent
permissible input current for current input (destruction limit), max.	50 mA; Permanent
Electrical input frequency, max.	400 Hz
No-load voltage for resistance-type transmitter, typ.	3.3 V
Constant measurement current for resistance-type transmitter, typ.	1.25 mA
Technical unit for temperature measurement adjustable	Yes; Degrees Celsius / degrees Fahrenheit / Kelvin
Input ranges	
Voltage	Yes; ± 10 V / 100 k Ω ; 0 V to 10 V / 100 k Ω
Current	Yes; ±20 mA / 100 Ω ; 0 mA to 20 mA / 100 Ω ; 4 mA to 20 mA / 100 Ω
Resistance thermometer	Yes; Pt 100 / 10 MΩ
Resistance	Yes; 0 Ω to 600 Ω / 10 M Ω
Input ranges (rated values), voltages	V
• 0 to +10 V	Yes
— Input resistance (0 to 10 V)	100 kΩ
Input ranges (rated values), currents	Van
• 0 to 20 mA	Yes
— Input resistance (0 to 20 mA)	100 Ω
• -20 mA to +20 mA	Yes
— Input resistance (-20 mA to +20 mA)	100 Ω
• 4 mA to 20 mA	Yes
— Input resistance (4 mA to 20 mA)	100 Ω
Input ranges (rated values), resistance thermometer • Pt 100	Yes
— Input resistance (Pt 100)	10 MΩ
Input ranges (rated values), resistors	10 M77
• 0 to 600 ohms	Yes
Input resistance (0 to 600 ohms)	10 MΩ
Thermocouple (TC)	TO MAL
Temperature compensation	
— parameterizable	No
paramotonzable	

Characteristic linearization	V
parameterizable	Yes; by software
— for resistance thermometer	Pt 100
Cable length	
• shielded, max.	100 m
Analog outputs	
Number of analog outputs	2
integrated channels (AO)	2
Voltage output, short-circuit protection	Yes
Voltage output, short-circuit current, max.	55 mA
Current output, no-load voltage, max.	14 V
Output ranges, voltage	
• 0 to 10 V	Yes
• -10 V to +10 V	Yes
Output ranges, current	
• 0 to 20 mA	Yes
• -20 mA to +20 mA	Yes
• 4 mA to 20 mA	Yes
Connection of actuators	
for voltage output two-wire connection	Yes; Without compensation of the line resistances
for voltage output four-wire connection	No
for current output two-wire connection	Yes
Load impedance (in rated range of output)	
with voltage outputs, min.	1 kΩ
with voltage outputs, rimit. with voltage outputs, capacitive load, max.	0.1 μF
with voltage outputs, capacitive load, max. with current outputs, max.	300 Ω
·	
with current outputs, inductive load, max. Postruction limits assists extendelly applied voltages and surrents.	0.1 mH
Destruction limits against externally applied voltages and currents	40 V ₂ D
Voltages at the outputs towards MANA	16 V; Permanent
Current, max.	50 mA; Permanent
Cable length	
shielded, max.	200 m
Analog value generation for the inputs	
Measurement principle	Actual value encryption (successive approximation)
Measurement principle Integration and conversion time/resolution per channel	
Measurement principle	Actual value encryption (successive approximation) 12 bit
Measurement principle Integration and conversion time/resolution per channel	
Measurement principle Integration and conversion time/resolution per channel Resolution with overrange (bit including sign), max. Integration time, parameterizable Interference voltage suppression for interference	12 bit
Measurement principle Integration and conversion time/resolution per channel Resolution with overrange (bit including sign), max. Integration time, parameterizable Interference voltage suppression for interference frequency f1 in Hz	12 bit Yes; 16.6 / 20 ms 50 / 60 Hz
Measurement principle Integration and conversion time/resolution per channel Resolution with overrange (bit including sign), max. Integration time, parameterizable Interference voltage suppression for interference frequency f1 in Hz Time constant of the input filter	12 bit Yes; 16.6 / 20 ms 50 / 60 Hz 0.38 ms
Measurement principle Integration and conversion time/resolution per channel Resolution with overrange (bit including sign), max. Integration time, parameterizable Interference voltage suppression for interference frequency f1 in Hz Time constant of the input filter Basic execution time of the module (all channels	12 bit Yes; 16.6 / 20 ms 50 / 60 Hz
Measurement principle Integration and conversion time/resolution per channel Resolution with overrange (bit including sign), max. Integration time, parameterizable Interference voltage suppression for interference frequency f1 in Hz Time constant of the input filter Basic execution time of the module (all channels released)	12 bit Yes; 16.6 / 20 ms 50 / 60 Hz 0.38 ms
Measurement principle Integration and conversion time/resolution per channel Resolution with overrange (bit including sign), max. Integration time, parameterizable Interference voltage suppression for interference frequency f1 in Hz Time constant of the input filter Basic execution time of the module (all channels released) Analog value generation for the outputs	12 bit Yes; 16.6 / 20 ms 50 / 60 Hz 0.38 ms
Measurement principle Integration and conversion time/resolution per channel Resolution with overrange (bit including sign), max. Integration time, parameterizable Interference voltage suppression for interference frequency f1 in Hz Time constant of the input filter Basic execution time of the module (all channels released) Analog value generation for the outputs Integration and conversion time/resolution per channel	12 bit Yes; 16.6 / 20 ms 50 / 60 Hz 0.38 ms 1 ms
Measurement principle Integration and conversion time/resolution per channel Resolution with overrange (bit including sign), max. Integration time, parameterizable Interference voltage suppression for interference frequency f1 in Hz Time constant of the input filter Basic execution time of the module (all channels released) Analog value generation for the outputs Integration and conversion time/resolution per channel Resolution with overrange (bit including sign), max.	12 bit Yes; 16.6 / 20 ms 50 / 60 Hz 0.38 ms 1 ms
Measurement principle Integration and conversion time/resolution per channel Resolution with overrange (bit including sign), max. Integration time, parameterizable Interference voltage suppression for interference frequency f1 in Hz Time constant of the input filter Basic execution time of the module (all channels released) Analog value generation for the outputs Integration and conversion time/resolution per channel Resolution with overrange (bit including sign), max. Conversion time (per channel)	12 bit Yes; 16.6 / 20 ms 50 / 60 Hz 0.38 ms 1 ms
Measurement principle Integration and conversion time/resolution per channel Resolution with overrange (bit including sign), max. Integration time, parameterizable Interference voltage suppression for interference frequency f1 in Hz Time constant of the input filter Basic execution time of the module (all channels released) Analog value generation for the outputs Integration and conversion time/resolution per channel Resolution with overrange (bit including sign), max. Conversion time (per channel) Settling time	12 bit Yes; 16.6 / 20 ms 50 / 60 Hz 0.38 ms 1 ms 12 bit 1 ms
Measurement principle Integration and conversion time/resolution per channel Resolution with overrange (bit including sign), max. Integration time, parameterizable Interference voltage suppression for interference frequency f1 in Hz Time constant of the input filter Basic execution time of the module (all channels released) Analog value generation for the outputs Integration and conversion time/resolution per channel Resolution with overrange (bit including sign), max. Conversion time (per channel) Settling time for resistive load	12 bit Yes; 16.6 / 20 ms 50 / 60 Hz 0.38 ms 1 ms 12 bit 1 ms
Measurement principle Integration and conversion time/resolution per channel Resolution with overrange (bit including sign), max. Integration time, parameterizable Interference voltage suppression for interference frequency f1 in Hz Time constant of the input filter Basic execution time of the module (all channels released) Analog value generation for the outputs Integration and conversion time/resolution per channel Resolution with overrange (bit including sign), max. Conversion time (per channel) Settling time for resistive load for capacitive load	12 bit Yes; 16.6 / 20 ms 50 / 60 Hz 0.38 ms 1 ms 12 bit 1 ms 0.6 ms 1 ms
Measurement principle Integration and conversion time/resolution per channel Resolution with overrange (bit including sign), max. Integration time, parameterizable Interference voltage suppression for interference frequency f1 in Hz Time constant of the input filter Basic execution time of the module (all channels released) Analog value generation for the outputs Integration and conversion time/resolution per channel Resolution with overrange (bit including sign), max. Conversion time (per channel) Settling time for resistive load for capacitive load for inductive load	12 bit Yes; 16.6 / 20 ms 50 / 60 Hz 0.38 ms 1 ms 12 bit 1 ms
Measurement principle Integration and conversion time/resolution per channel Resolution with overrange (bit including sign), max. Integration time, parameterizable Interference voltage suppression for interference frequency f1 in Hz Time constant of the input filter Basic execution time of the module (all channels released) Analog value generation for the outputs Integration and conversion time/resolution per channel Resolution with overrange (bit including sign), max. Conversion time (per channel) Settling time for resistive load for capacitive load for inductive load Encoder	12 bit Yes; 16.6 / 20 ms 50 / 60 Hz 0.38 ms 1 ms 12 bit 1 ms 0.6 ms 1 ms
Measurement principle Integration and conversion time/resolution per channel Resolution with overrange (bit including sign), max. Integration time, parameterizable Interference voltage suppression for interference frequency f1 in Hz Time constant of the input filter Basic execution time of the module (all channels released) Analog value generation for the outputs Integration and conversion time/resolution per channel Resolution with overrange (bit including sign), max. Conversion time (per channel) Settling time for resistive load for capacitive load for inductive load	12 bit Yes; 16.6 / 20 ms 50 / 60 Hz 0.38 ms 1 ms 12 bit 1 ms 0.6 ms 1 ms
Measurement principle Integration and conversion time/resolution per channel Resolution with overrange (bit including sign), max. Integration time, parameterizable Interference voltage suppression for interference frequency f1 in Hz Time constant of the input filter Basic execution time of the module (all channels released) Analog value generation for the outputs Integration and conversion time/resolution per channel Resolution with overrange (bit including sign), max. Conversion time (per channel) Settling time for resistive load for capacitive load for inductive load Encoder	12 bit Yes; 16.6 / 20 ms 50 / 60 Hz 0.38 ms 1 ms 12 bit 1 ms 0.6 ms 1 ms
Measurement principle Integration and conversion time/resolution per channel Resolution with overrange (bit including sign), max. Integration time, parameterizable Interference voltage suppression for interference frequency f1 in Hz Time constant of the input filter Basic execution time of the module (all channels released) Analog value generation for the outputs Integration and conversion time/resolution per channel Resolution with overrange (bit including sign), max. Conversion time (per channel) Settling time for resistive load for capacitive load for inductive load Encoder Connection of signal encoders	12 bit Yes; 16.6 / 20 ms 50 / 60 Hz 0.38 ms 1 ms 12 bit 1 ms 0.6 ms 1 ms 0.5 ms
Measurement principle Integration and conversion time/resolution per channel Resolution with overrange (bit including sign), max. Integration time, parameterizable Interference voltage suppression for interference frequency f1 in Hz Time constant of the input filter Basic execution time of the module (all channels released) Analog value generation for the outputs Integration and conversion time/resolution per channel Resolution with overrange (bit including sign), max. Conversion time (per channel) Settling time for resistive load for capacitive load for inductive load for inductive load Encoder Connection of signal encoders for voltage measurement	12 bit Yes; 16.6 / 20 ms 50 / 60 Hz 0.38 ms 1 ms 12 bit 1 ms 0.6 ms 1 ms 0.5 ms
Measurement principle Integration and conversion time/resolution per channel Resolution with overrange (bit including sign), max. Integration time, parameterizable Interference voltage suppression for interference frequency f1 in Hz Time constant of the input filter Basic execution time of the module (all channels released) Analog value generation for the outputs Integration and conversion time/resolution per channel Resolution with overrange (bit including sign), max. Conversion time (per channel) Settling time for resistive load for capacitive load for inductive load for inductive load Encoder Connection of signal encoders for voltage measurement for current measurement as 2-wire transducer	12 bit Yes; 16.6 / 20 ms 50 / 60 Hz 0.38 ms 1 ms 12 bit 1 ms 0.6 ms 1 ms 0.5 ms Yes Yes; with external supply
Measurement principle Integration and conversion time/resolution per channel Resolution with overrange (bit including sign), max. Integration time, parameterizable Interference voltage suppression for interference frequency f1 in Hz Time constant of the input filter Basic execution time of the module (all channels released) Analog value generation for the outputs Integration and conversion time/resolution per channel Resolution with overrange (bit including sign), max. Conversion time (per channel) Settling time for resistive load for capacitive load for inductive load for inductive load Encoder Connection of signal encoders for voltage measurement for current measurement as 2-wire transducer for current measurement as 4-wire transducer	12 bit Yes; 16.6 / 20 ms 50 / 60 Hz 0.38 ms 1 ms 12 bit 1 ms 0.6 ms 1 ms 0.5 ms Yes Yes; with external supply Yes
Measurement principle Integration and conversion time/resolution per channel Resolution with overrange (bit including sign), max. Integration time, parameterizable Interference voltage suppression for interference frequency f1 in Hz Time constant of the input filter Basic execution time of the module (all channels released) Analog value generation for the outputs Integration and conversion time/resolution per channel Resolution with overrange (bit including sign), max. Conversion time (per channel) Settling time for resistive load for capacitive load for inductive load 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	12 bit Yes; 16.6 / 20 ms 50 / 60 Hz 0.38 ms 1 ms 12 bit 1 ms 0.6 ms 1 ms 0.5 ms Yes Yes; with external supply Yes Yes; Without compensation of the line resistances
Measurement principle Integration and conversion time/resolution per channel Resolution with overrange (bit including sign), max. Integration time, parameterizable Interference voltage suppression for interference frequency f1 in Hz Time constant of the input filter Basic execution time of the module (all channels released) Analog value generation for the outputs Integration and conversion time/resolution per channel Resolution with overrange (bit including sign), max. Conversion time (per channel) Settling time for resistive load for capacitive load for inductive load for ourrent 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	12 bit Yes; 16.6 / 20 ms 50 / 60 Hz 0.38 ms 1 ms 12 bit 1 ms 0.6 ms 1 ms 0.5 ms Yes Yes; with external supply Yes Yes; Without compensation of the line resistances No
Measurement principle Integration and conversion time/resolution per channel Resolution with overrange (bit including sign), max. Integration time, parameterizable Interference voltage suppression for interference frequency f1 in Hz Time constant of the input filter Basic execution time of the module (all channels released) Analog value generation for the outputs Integration and conversion time/resolution per channel Resolution with overrange (bit including sign), max. Conversion time (per channel) Settling time for resistive load for capacitive load for inductive load for inductive load For ourrent 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 four-wire connection for resistance measurement with four-wire connection	12 bit Yes; 16.6 / 20 ms 50 / 60 Hz 0.38 ms 1 ms 12 bit 1 ms 0.6 ms 1 ms 0.5 ms Yes Yes; with external supply Yes Yes; Without compensation of the line resistances No
Measurement principle Integration and conversion time/resolution per channel Resolution with overrange (bit including sign), max. Integration time, parameterizable Interference voltage suppression for interference frequency f1 in Hz Time constant of the input filter Basic execution time of the module (all channels released) Analog value generation for the outputs Integration and conversion time/resolution per channel Resolution with overrange (bit including sign), max. Conversion time (per channel) Settling time for resistive load for capacitive load for inductive load 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 four-wire connection for resistance measurement with four-wire connection	12 bit Yes; 16.6 / 20 ms 50 / 60 Hz 0.38 ms 1 ms 12 bit 1 ms 0.6 ms 1 ms 0.5 ms Yes Yes; with external supply Yes Yes; Without compensation of the line resistances No No

Errors/accuracies	
Temperature error (relative to input range), (+/-)	0.006 %/K
Crosstalk between the inputs, min.	60 dB
Repeat accuracy in steady state at 25 °C (relative to input range), (+/-)	0.06 %
Output ripple (relative to output range, bandwidth 0 to 50 kHz), (+/-)	0.1 %
Linearity error (relative to output range), (+/-)	0.15 %
Temperature error (relative to output range), (+/-)	0.01 %/K
Crosstalk between the outputs, min.	60 dB
Repeat accuracy in steady state at 25 °C (relative to output range), (+/-)	0.06 %
Operational error limit in overall temperature range	
 Voltage, relative to input range, (+/-) 	1 %
 Current, relative to input range, (+/-) 	1 %
 Resistance, relative to input range, (+/-) 	1 %
 Voltage, relative to output range, (+/-) 	1 %
 Current, relative to output range, (+/-) 	1 %
Basic error limit (operational limit at 25 °C)	
Voltage, relative to input range, (+/-)	0.8 %; Linearity error ±0.06 %
Current, relative to input range, (+/-)	0.8 %; Linearity error ±0.06 %
• Resistance, relative to input range, (+/-)	0.8 %; Linearity error ±0.2 %
Resistance thermometer, relative to input range, (+/-)	0.8 %
 Voltage, relative to output range, (+/-) 	0.8 %
Current, relative to output range, (+/-)	0.8 %
Interference voltage suppression for f = n x (f1 +/- 1 %), f1 = interference	
Series mode interference (peak value of interference < rated value of input range), min.	30 dB
Common mode interference, min.	40 dB
Interfaces	
Number of industrial Ethernet interfaces	0
Number of PROFINET interfaces	0
Number of RS 485 interfaces	1; MPI
Number of RS 422 interfaces	1; RS 422 / 485 combined
Point-to-point connection	
Cable length, max.	1 200 m
Integrated protocol driver	
— 3964 (R)	Yes
— ASCII	Yes
— RK 512	Yes
Transmission rate, RS 422/485	
— with 3964 (R) protocol, max.	19.2 kbit/s; 38.4 kbit/s half duplex; 19.2 kbit/s full duplex
— with ASCII protocol, max.	19.2 kbit/s; 38.4 kbit/s half duplex; 19.2 kbit/s full duplex
— with RK 512 protocol, max.	19.2 kbit/s; 38.4 kbit/s half duplex; 19.2 kbit/s full duplex
1. Interface	
Interface type	Integrated RS 485 interface
Isolated	No
Interface types	
• RS 485	Yes
Output current of the interface, max.	200 mA
Protocols	
• MPI	Yes
PROFIBUS DP master	No
PROFIBUS DP device	No
Point-to-point connection	No
MPI	10
Transmission rate, max.	187.5 kbit/s
Services	TOTA MUNICO
	Vac
— PG/OP communication	Yes
— Routing	No Voc
— Global data communication	Yes
 — S7 basic communication 	Yes

— S7 communication	Yes; Only server, configured on one side
— S7 communication — S7 communication, as client	No; but via CP and loadable FB
— S7 communication, as crient — S7 communication, as server	Yes
2. Interface	100
Interface type	Integrated RS 422/ 485 interface
Isolated	Yes
Interface types	163
• RS 485	Yes; RS 422 / 485 (X.27)
Output current of the interface, max.	No
Protocols	
• MPI	No
PROFINET IO Controller	No
PROFINET IO Device	No
PROFINET CBA	No
PROFIBUS DP master	No
PROFIBUS DP device	No
Point-to-point connection	Yes
Point-to-point connection	165
Transmission rate, max.	19.2 kbit/s; 38.4 kbit/s half duplex; 19.2 kbit/s full duplex
Interface controllable from the user program	Yes
Interface controllable from the user program Interface can trigger alarm/interrupt in the user program	Yes; Message on break - identification
Protocols	1 co, message on break - neerlineation
PROFIsafe	No
communication functions / header	110
	Von
PG/OP communication	Yes
Data record routing Global data communication	No
	Von
• supported	Yes
Number of GD loops, max.	8
Number of GD packets, max.	8
Number of GD packets, transmitter, max.	8
Number of GD packets, receiver, max.	8
Size of GD packets, max.	22 byte
Size of GD packet (of which consistent), max.	22 byte
S7 basic communication	V
• supported	Yes
User data per job, max.	76 byte
 User data per job (of which consistent), max. 	76 byte; 76 bytes (with X_SEND or X_RCV); 64 bytes (with X_PUT or X_GET as server)
S7 communication	
• supported	Yes
• as server	Yes
• as client	Yes; Via CP and loadable FB
User data per job, max.	180 kbyte; With PUT/GET
User data per job (of which consistent), max.	240 byte; as server
S5 compatible communication	
• supported	Yes; via CP and loadable FC
Number of connections	
• overall	12
usable for PG communication	11
— reserved for PG communication	1
 adjustable for PG communication, min. 	1
adjustable for PG communication, max.	11
usable for OP communication	11
reserved for OP communication	1
adjustable for OP communication, min.	1
adjustable for OP communication, max.	11
usable for S7 basic communication	8
reserved for S7 basic communication	0
adjustable for S7 basic communication, min.	0
adjustable for S7 basic communication, min. - adjustable for S7 basic communication, max.	8
— adjustable for or basic confittuitication, max.	

7 message functions	40.00
Number of login stations for message functions, max.	12; Depending on the configured connections for PG/OP and S7 basic communication
Process diagnostic messages	Yes
simultaneously active Alarm-S blocks, max.	300
est commissioning functions	
Status block	Yes; Up to 2 simultaneously
Single step	Yes
Number of breakpoints	4
Status/control	
Status/control variable	Yes
Variables	Inputs, outputs, memory bits, DB, times, counters
 Number of variables, max. 	30
— of which status variables, max.	30
of which control variables, max.	14
Forcing	
• Forcing	Yes
• Forcing, variables	Inputs, outputs
Number of variables, max.	10
Diagnostic buffer	
• present	Yes
 Number of entries, max. 	500
— adjustable	No
of which powerfail-proof	100; Only the last 100 entries are retained
 Number of entries readable in RUN, max. 	499
— adjustable	Yes; From 10 to 499
— preset	10
Service data	
can be read out	Yes
nterrupts/diagnostics/status information	
Diagnostics indication LED	
 Status indicator digital input (green) 	Yes
Status indicator digital output (green)	Yes
ntegrated Functions	
Frequency measurement	Yes
Number of frequency meters	4; up to 60 kHz (see "Technological Functions" manual)
controlled positioning	Yes
integrated function blocks (closed-loop control)	Yes; PID controller (see "Technological Functions" manual)
PID controller	Yes
Number of pulse outputs	4; Pulse width modulation up to 2.5 kHz (see "Technological Functions" Manual)
Limit frequency (pulse)	2.5 kHz
otential separation	
Potential separation digital inputs	
Potential separation digital inputs	Yes
between the channels	No
between the channels and backplane bus	Yes
Potential separation digital outputs	
Potential separation digital outputs	Yes
between the channels	Yes
between the channels, in groups of	8
between the channels and backplane bus	Yes
Potential separation analog inputs	V
Potential separation analog inputs	Yes; common for analog I/O
between the channels	No
between the channels and backplane bus	Yes
Potential separation analog outputs	
Potential separation analog outputs	Yes; common for analog I/O
between the channels	No
 between the channels and backplane bus 	Yes

Ambient temperature during operation • min. • max. • 60 °C configuration / header Configuration software • STEP 7 • STEP 7 Yes; STEP 7 V5.5 + SP1 or higher or STEP 7 V5.3 + SP2 or higher with HSP 203 • STEP 7 Lite • No configuration / programming / header • Command set • Nesting levels • Nesting levels • System functions (SFC) • System function blocks (SFB) Programming language - LAD - FBD - FBD - STL - SCL - SCL - CFC - GRAPH - HiGraph® Yes Know-how protection • User program protection/password protection • User program protection • User program protection • User program protection yes • Block encryption Dimensions Weights Weight approx. 6880 g	Isolation tested with	600 V DC
 • min. • max. 60 °C configuration / header Configuration software ● STEP 7 • STEP 7 Lite • STEP 7 Lite • Command set • Nesting levels • System functions (SFC) • System function blocks (SFB) responsible functions (SFC) • System function softxare - LAD - FBD - STL - SCL - SCL - GRAPH - HiGraph® ★ User program protection/password protection • Block encryption Ves • Block encryption Ves Width 120 mm Height Depth 130 mm Woodents 	Ambient conditions	
• max. 60 °C configuration / beader • STEP 7 Yes, STEP 7 V5.5 + SP1 or higher or STEP 7 V5.3 + SP2 or higher with HSP 203 • STEP 7 Lite No configuration / programming / header See instruction list • Nesting levels 8 • System functions (SFC) see instruction list • System function blocks (SFB) see instruction list Programming language Yes — FBD Yes — STL Yes — SCL Yes — CFC Yes — GRAPH Yes — HiGraph® Yes Know-how protection Yes • Block encryption Yes; With S7 block Privacy Dimensions 120 mm Width 120 mm Depth 130 mm Weights	Ambient temperature during operation	
configuration / header Configuration software Yes: STEP 7 V5.5 + SP1 or higher or STEP 7 V5.3 + SP2 or higher with HSP 203 • STEP 7 Lite No configuration / programming / header see instruction list • Command set see instruction list • Nesting levels 8 • System function s(SFC) see instruction list • System function blocks (SFB) see instruction list Programming language Yes — LAD Yes — FBD Yes — STL Yes — SCL Yes — CFC Yes — GRAPH Yes — HiGraph® Yes Know-how protection Yes • Block encryption Yes; With S7 block Privacy Dimensions 226 mm Depth 130 mm Weights	• min.	0 °C
Configuration software Yes; STEP 7 V5.5 + SP1 or higher or STEP 7 V5.3 + SP2 or higher with HSP 203 • STEP 7 Lite No configuration / programming / header see instruction list • Command set see instruction list • Nesting levels 8 • System functions (SFC) see instruction list • System function blocks (SFB) see instruction list Programming language — LAD — FBD Yes — STL Yes — SCL Yes — CFC Yes — GRAPH Yes — HiGraph® Yes Know-how protection Yes; With S7 block Privacy Dimensions Vidth Width 120 mm Height 125 mm Depth 130 mm	• max.	60 °C
● STEP 7 ● STEP 7 Lite No configuration / programming / header ● Command set ● Nesting levels ● System functions (SFC) ● System function blocks (SFB) Programming language - LAD - FBD - STL - SCL - CFC - GRAPH - HiGraph® Know-how protection ● User program protection/password protection ● User program protection/password protection ● Block encryption Dimensions Ves 120 mm Neights No No No No No No No No No N	configuration / header	
● STEP 7 Lite configuration / programming / header ● Command set ● Nesting levels ● System functions (SFC) ● System function blocks (SFB) Programming language — LAD — FBD — Yes — STL — SCL — SCL — CFC — GRAPH — HiGraph® Know-how protection ● User program protection/password protection ● Block encryption Width 120 mm Height Depth Wesights	Configuration software	
configuration / programming / header Command set See instruction list System functions (SFC) See instruction list System function blocks (SFB) See instruction list Programming language LAD FBD Yes STL SCL Yes SCL Yes CFC GRAPH HiGraph® Yes Know-how protection Slock encryption Pilosck encryption Vision Width 120 mm Height Depth 130 mm Weights	• STEP 7	
Command set Nesting levels System functions (SFC) see instruction list System function blocks (SFB) see instruction list Programming language — LAD — FBD — Yes — STL — Yes — SCL — CFC — GRAPH — HiGraph® Xnow-how protection ■ User program protection/password protection ■ Block encryption Dimensions Width Height Depth 130 mm Weights See instruction list 8 8 8 8 8 8 8 8 8 8 8 8 8 8 8 8 8 8	STEP 7 Lite	No
	configuration / programming / header	
	 Command set 	see instruction list
System function blocks (SFB) Programming language - LAD - FBD - STL - STL - SCL - CFC - GRAPH - HiGraph® **Now-how protection* **User program protection/password protection* **Block encryption* Dimensions* Width Height Depth **Description* See instruction list Yes Yes Yes Yes Yes Yes Yes Y	 Nesting levels 	8
Programming language Yes — FBD Yes — STL Yes — SCL Yes — CFC Yes — GRAPH Yes — HiGraph® Yes Know-how protection Yes • Block encryption Yes; With S7 block Privacy Dimensions Width 120 mm Height 125 mm Depth 130 mm Weights Weights	System functions (SFC)	see instruction list
— LAD Yes — FBD Yes — STL Yes — SCL Yes — CFC Yes — GRAPH Yes — HiGraph® Yes Know-how protection Yes • User program protection/password protection Yes; With S7 block Privacy Dimensions Yes; With S7 block Privacy Width 120 mm Height 125 mm Depth 130 mm Weights	System function blocks (SFB)	see instruction list
— FBD Yes — STL Yes — SCL Yes — CFC Yes — GRAPH Yes — HiGraph® Yes Know-how protection Yes • User program protection/password protection Yes; With S7 block Privacy Dimensions Yes; With S7 block Privacy Width 120 mm Height 125 mm Depth 130 mm Weights Yes	Programming language	
— STL Yes — SCL Yes — CFC Yes — GRAPH Yes — HiGraph® Yes Know-how protection Yes • User program protection/password protection Yes; With S7 block Privacy Dimensions Width 120 mm Height 125 mm Depth 130 mm Weights Weights	— LAD	Yes
- SCL Yes - CFC Yes - GRAPH Yes - HiGraph® Yes Know-how protection • User program protection/password protection Yes; With S7 block Privacy Dimensions Width 120 mm Height 125 mm Depth 130 mm Weights	— FBD	Yes
- CFC - GRAPH - HiGraph® Yes Know-how protection ● User program protection/password protection ● Block encryption Yes; With S7 block Privacy Dimensions Width 120 mm Height 125 mm Depth 130 mm Weights	— STL	Yes
- GRAPH - HiGraph® Yes Know-how protection ● User program protection/password protection ● Block encryption Yes; With S7 block Privacy Dimensions Width 120 mm Height 125 mm Depth 130 mm Weights	— SCL	Yes
— HiGraph® Know-how protection ● User program protection/password protection ● Block encryption Yes; With S7 block Privacy Dimensions Width 120 mm Height 125 mm Depth 130 mm Weights	— CFC	Yes
Know-how protection User program protection/password protection Block encryption Yes; With S7 block Privacy Dimensions Width 120 mm Height 125 mm Depth 130 mm Weights	— GRAPH	Yes
 User program protection/password protection Block encryption Yes; With S7 block Privacy Dimensions Width Height Depth 120 mm Height Depth 130 mm Weights 	— HiGraph®	Yes
● Block encryption Pimensions Width 120 mm Height Depth 130 mm Weights	Know-how protection	
Dimensions Width 120 mm Height 125 mm Depth 130 mm Weights 130 mm	 User program protection/password protection 	Yes
Width 120 mm Height 125 mm Depth 130 mm Weights 130 mm	Block encryption	Yes; With S7 block Privacy
Height 125 mm Depth 130 mm Weights	Dimensions	
Depth 130 mm Weights	Width	120 mm
Weights	Height	125 mm
	Depth	130 mm
Weight, approx. 680 g	Weights	
	Weight, approx.	680 g

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