SIEMENS

Data sheet

6ES7412-1XJ07-0AB0



SIMATIC S7-400, CPU 412-1 Central processing unit with: Work memory 512 KB, (256 KB code, 256 KB data), interface MPI/DP 12 Mbit/s,

General information	
Product type designation	CPU 412-1
HW functional status	01
Firmware version	V7.0
Product function	
Isochronous mode	Yes; For PROFIBUS only
Engineering with	
Programming package	STEP 7 V5.4 or higher with HSP 261
CiR - Configuration in RUN	
CiR synchronization time, basic load	100 ms
CiR synchronization time, time per I/O byte	30 μs
Supply voltage	
Rated value (DC)	Power supply via system power supply
nput current	
from backplane bus 5 V DC, typ.	0.7 A
from backplane bus 5 V DC, max.	0.8 A
from backplane bus 24 V DC, max.	150 mA; 150 mA per DP interface
from interface 5 V DC, max.	90 mA; At the DP interface
Power loss	
Power loss, typ.	3.5 W
l lemory	
Type of memory	RAM
Work memory	
integrated	512 kbyte
integrated (for program)	256 kbyte
• integrated (for data)	256 kbyte
expandable	No
Load memory	
expandable FEPROM	Yes; with Memory Card (FLASH)
expandable FEPROM, max.	64 Mbyte
• integrated RAM, max.	512 kbyte
expandable RAM	Yes; with Memory Card (RAM)
expandable RAM, max.	64 Mbyte
Backup	
• present	Yes
with battery	Yes; all data
without battery	No
- Battery	
Backup battery	
Backup current, typ.	180 μA; up to 40 °C

	272 4
Backup current, max.	850 µA
Backup time, max.	Dealt with in the module data manual with the secondary conditions and the factors of influence
 Feeding of external backup voltage to CPU 	5 V DC to 15 V DC
CPU processing times	
for bit operations, typ.	31.25 ns
for word operations, typ.	31.25 ns
for fixed point arithmetic, typ.	31.25 ns
for floating point arithmetic, typ.	62.5 ns
CPU-blocks	
DB	
Number, max.	3 000; Number range: 1 to 16000
• Size, max.	64 kbyte
FB	,
Number, max.	1 500; Number range: 0 to 7999
• Size, max.	64 kbyte
FC	· · ·,·
Number, max.	1 500; Number range: 0 to 7999
• Size, max.	64 kbyte
ОВ	
Number, max.	see instruction list
• Size, max.	64 kbyte
Number of free cycle OBs	1; OB 1
Number of time alarm OBs	2; OB 10, 11
Number of delay alarm OBs	2; OB 20, 21
Number of cyclic interrupt OBs	2; OB 32, 35 (shortest cycle that can be set = 500 µs)
Number of process alarm OBs	2; OB 40, 41
Number of DPV1 alarm OBs	3; OB 55-57
 Number of isochronous mode OBs 	2; OB 61-62
 Number of multicomputing OBs 	1; OB 60
Number of background OBs	1; OB 90
Number of startup OBs	3; OB 100-102
Number of asynchronous error OBs	9; OB 80-88
Number of synchronous error OBs	2; OB 121, 122
Nesting depth	
per priority class	24
additional within an error OB	1
Counters, timers and their retentivity	
S7 counter	
Number	2 048
Retentivity	
— adjustable	Yes
— preset	Z 0 to Z 7
Counting range	
— lower limit	0
— upper limit	999
IEC counter	
• present	Yes
• Type	SFB
• Number	Unlimited (limited only by RAM capacity)
S7 times	
Number	2 048
Retentivity	
— adjustable	Yes
— preset	No times retentive
Time range	
— lower limit	10 ms
— upper limit	9 990 s
IEC timer	
• present	Yes
• Type	SFB

Number	Unlimited (limited only by RAM capacity)
Data areas and their retentivity	
Retentive data area (incl. timers, counters, flags), max.	Total working and load memory (with backup battery)
Flag	
• Size, max.	4 kbyte; Size of bit memory address area
Retentivity available	Yes
Retentivity preset	MB 0 to MB 15
Number of clock memories	8; in 1 memory byte
Local data	
 adjustable, max. 	8 kbyte
• preset	4 kbyte
Address area	
I/O address area	
• Inputs	4 kbyte
Outputs	4 kbyte
Process image	
 Inputs, adjustable 	4 kbyte
Outputs, adjustable	4 kbyte
• Inputs, default	128 byte
Outputs, default	128 byte
consistent data, max.	244 byte
Access to consistent data in process image	Yes
Subprocess images	4E
Number of subprocess images, max. Digital changes.	15
Digital channels	22.700
• Inputs	32 768
— of which central	32 768 32 768
Outputs — of which central	32 768
Analog channels	32 700
Inputs	2 048
— of which central	2 048
Outputs	2 048
— of which central	2 048
Hardware configuration	2010
Number of expansion units, max.	21
connectable OPs	47
Multicomputing	Yes; 4 CPUs max. (with UR1 or UR2)
Interface modules	1.55, 1.51.55 (
Number of connectable IMs (total), max.	6
Number of connectable IM 460s, max.	6
Number of connectable IM 463s, max.	4; IM 463-2
Number of DP masters	
• integrated	1
• via CP	10; CP 443-5 Extended
• via IM 467	4
Mixed mode IM + CP permitted	No; IM 467 cannot be used jointly with CP 443-5 Ext. or CP 443-1 in PROFINET IO mode
via interface module	0
 Number of pluggable S5 modules (via adapter capsule in central device), max. 	6
Number of IO Controllers	
• integrated	0
• via CP	4; Max. 4 in the central controller; no mixed operation of different CP 443-1
Number of operable EMs and CPs (recommended)	types in PROFINET IO mode
Number of operable FMs and CPs (recommended) • FM	Limited by number of slots and number of connections
• CP, PtP	CP 440: Limited by number of slots; CP 441: Limited by number of slots and
- Oi , i u	number of connections
PROFIBUS and Ethernet CPs	14; In total max. 10 CPs as DP master and PROFINET controller, of which up to 10 IMs or CPs as DP master and up to 4 CPs as PROFINET controller
Slots	

• required slots	1
Time of day	
Clock	
Hardware clock (real-time)	Yes
retentive and synchronizable	Yes
Resolution	1 ms
 Deviation per day (buffered), max. 	1.7 s; Power off
 Deviation per day (unbuffered), max. 	8.6 s; For power On
Operating hours counter	
Number	16
Number/Number range	0 to 15
Range of values	SFCs 2, 3 and 4: 0 to 32767 hours SFC 101: 0 to 2^31 - 1 hours
Granularity	1 h
• retentive	Yes
Clock synchronization	
• supported	Yes
• to MPI, master	Yes
• on MPI, device	Yes
• to DP, master	Yes
• on DP, device	Yes
• in AS, master	Yes
• in AS, device	Yes
on Ethernet via NTP	No; Via CP
• to IF 964 DP	No
Time difference in system when synchronizing via	
MPI, max.	200 ms
Interfaces	
Interfaces/bus type	1 x MPI/PROFIBUS DP
Number of RS 485 interfaces	1; Combined MPI / PROFIBUS DP
1. Interface	1, Combined wit 171 NOT IDGO DI
Interface type	MPI/PROFIBUS DP
Isolated	Yes
Interface types	165
• RS 485	Yes
Output current of the interface, max.	150 mA
Protocols	100 111/1
• MPI	Yes
PROFIBUS DP master	Yes
PROFIBUS DP device	Yes
MPI	163
Number of connections	32; If a diagnostics repeater is used on the line, the number of connection
Trainiber of connections	resources on the line is reduced by 1
Transmission rate, max.	12 Mbit/s
Services	
— PG/OP communication	Yes
— Routing	Yes
Global data communication	Yes
S7 basic communication	Yes
— S7 communication	Yes
S7 communication, as client	Yes
— S7 communication, as server	Yes
PROFIBUS DP master	
Number of connections, max.	16; If a diagnostics repeater is used on the line, the number of connection resources on the line is reduced by 1
Transmission rate, max.	12 Mbit/s
• max. number of DP devices	32
Services	
— PG/OP communication	Yes
— Routing	Yes; S7 routing
Global data communication	No
S7 basic communication	Yes

— S7 communication	Yes
S7 communication, as client	Yes
S7 communication, as server	Yes
— Equidistance	Yes
— Isochronous mode	Yes
— SYNC/FREEZE	Yes
activation/deactivation of DP devices	Yes
Direct data exchange (slave-to-slave)	Yes
communication)	165
— DPV1	Yes
Address area	
— Inputs, max.	2 kbyte
— Outputs, max.	2 kbyte
1st interface / DP master / payload data per DP Device / heade	er
 user data per DP device, max. 	244 byte
— Inputs, max.	244 byte
— Outputs, max.	244 byte
— Slots, max.	244
— per slot, max.	128 byte
1st interface / PROFIBUS DP device / header	
Number of connections	16
• GSD file	http://support.automation.siemens.com/WW/view/en/113652
Transmission rate, max.	12 Mbit/s
automatic baud rate search	No
 Address area, max. 	32; Virtual slots
User data per address area, max.	32 byte
— of which consistent, max.	32 byte
Services	
— PG/OP communication	Yes; with interface active
— Routing	Yes; with interface active
— Global data communication	No
 S7 basic communication 	No
— S7 communication	Yes
 S7 communication, as client 	Yes
 S7 communication, as server 	Yes
 Direct data exchange (slave-to-slave 	No
communication)	
— DPV1	No
Transfer memory	
— Inputs	244 byte
— Outputs	244 byte
Protocols	
Open IE communication	
• ISO-on-TCP (RFC1006)	Via CP 443-1 Adv. and loadable FB
— Data length, max.	1 452 bytes via CP 443-1 Adv.
Web server	
• supported	No
Isochronous mode	
Equidistance	Yes
Number of DP masters with isochronous mode	1
User data per isochronous slave, max.	244 byte
shortest clock pulse	1.5 ms; 0.5 ms without use of SFC 126, 127
max. cycle	32 ms
communication functions / header	
PG/OP communication	Yes
 Number of connectable OPs without message processing 	47
Number of connectable OPs with message processing	47; When using Alarm_S/SQ and Alarm_D/DQ
Data record routing	Yes
Global data communication	
• supported	Yes
 Number of GD loops, max. 	8

Number of CD packets, transmiter, max. Sizo of GD packet (private, max.		
Store of GD packet (or which consistent), max. * Supported * suppor	 Number of GD packets, transmitter, max. 	8
Standard Communication supported s	 Number of GD packets, receiver, max. 	16
### ST basic Communication ### User data per job, max. ### User data per job, max. ### User data per job (of which consistent), max. ### Vea ### ST communication ### User data per job, max. #### User data per job, max. ###### User data per job, max. #############################	 Size of GD packets, max. 	54 byte
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User data per job (of which consistent), max. ST communication	supported	Yes
### ST communication ### supported ### suppo	 User data per job, max. 	76 byte
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- adjustable for S7 basic communication, max. • usable for S7 communication - reserved for S7 communication 0 - usable for S7 communication, max. 0 • usable for routing - adjustable for S7 communication, max. • usable for routing - adjustable for S7 communication - adjustable for S7 communication - adjustable for S7 communication - adjustable for S7 communication, max. - Adjustable for S7 communication - blocks - Number of instances for alarm 8 and S7 communication - blocks, max. - precess control messages - ves Number of archives that can log on simultaneously (SFB 37 - AR_SEND) Number of messages - overall, max. - in 100 ms grid, max. - in 100 ms grid, max. - in 100 ms grid, max. - with 100 ms grid, max.		
usable for S7 communication - reserved for S7 communication - adjustable for S7 communication, max. usable for routing - reserved for routing - adjustable for routing - adjustable for routing - adjustable for routing, max. 0 S7 message functions Number of login stations for message functions, max. 47, Max. 47 with Alarm_S/SQ and Alarm_D/DQ (OPs); max. 8 with Alarm, Alarm_8, Alarm_8P, Notify and Notify_8 (e.g. WinCC) Symbol-related messages Yes SCAN procedure Yes Process diagnostic messages Yes Process diagnostic messages simultaneously active Alarm-S blocks, max. 250; Simultaneously active alarm_S/SQ blocks or alarm_D/DQ blocks Alarm 8-blocks • Number of instances for alarm 8 and S7 communication blocks, max. • preset, max. 150 Process control messages Yes Number of archives that can log on simultaneously (SFB 37 AR_SEND) Number of messages • overall, max. • in 100 ms grid, max. 100 • with 100 ms grid, max. 256 Number of additional values • with 100 ms grid, max. 0 0 0 0 0 0 0 0 0 0 0 0 0		
- reserved for S7 communication	•	
- adjustable for S7 communication, max. • usable for routing - reserved for routing - adjustable for routing, max. 57 message functions Number of login stations for message functions, max. Alarm_8, Alarm_8P, Notify and Notify_8 (e.g. WinCC) Symbol-related messages Yes SCAN procedure Yes Process diagnostic messages yes simultaneously active Alarm-S blocks, max. Alarm-8-blocks - Number of instances for alarm 8 and S7 communication blocks, max. • preset, max. • preset, max. Process control messages Yes Number of archives that can log on simultaneously (SFB 37 AR_SEND) Number of messages • overall, max. • in 100 ms grid, max. • in 100 ms grid, max. • with 100 ms grid, max.		
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- reserved for routing - adjustable for routing, max. 0 S7 message functions Number of login stations for message functions, max. 47; Max. 47 with Alarm_S/SQ and Alarm_D/DQ (OPs); max. 8 with Alarm, Alarm_8, Alarm_8P, Notify and Notify_8 (e.g. WinCC) Symbol-related messages Yes SCAN procedure Yes Program alarms Yes Process diagnostic messages Yes simultaneously active Alarm-S blocks, max. 250; Simultaneously active alarm_S/SQ blocks or alarm_D/DQ blocks Alarm 8-blocks Yes • Number of instances for alarm 8 and S7 communication blocks, max. 150 Process control messages Yes Number of archives that can log on simultaneously (SFB 37 AR_SEND) Number of messages • overall, max. 256 • in 100 ms grid, max. 256 • in 100 ms grid, max. 256 • in 100 ms grid, max. 256 Number of additional values • with 100 ms grid, max. 0 with 100 ms grid, max. 0 with 100 ms grid, max. 0		
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Number of login stations for message functions, max. Alarm_8, Alarm_8P, Notify and Notify_8 (e.g. WinCC) Symbol-related messages Yes SCAN procedure Program alarms Yes Process diagnostic messages simultaneously active Alarm-8 blocks, max. Alarm_8-Notify and Notify_8 (e.g. WinCC) Yes Program alarms Yes Process diagnostic messages yes simultaneously active Alarm-S/SQ blocks or alarm_D/DQ blocks Alarm 8-blocks Number of instances for alarm 8 and S7 communication blocks, max. preset, max. preset, max. 150 Process control messages Number of archives that can log on simultaneously (SFB 37 AR_SEND) Number of messages overall, max. in 100 ms grid, max. in 500 ms grid, max. 256 in 1000 ms grid, max. 256 vith 100 ms grid, max.	<u> </u>	
Number of login stations for message functions, max. 47; Max. 47 with Alarm_S/SQ and Alarm_D/DQ (OPs); max. 8 with Alarm, Alarm_8, Alarm_8, Notify and Notify_8 (e.g. WinCC) Symbol-related messages Yes SCAN procedure Yes Program alarms Yes Process diagnostic messages simultaneously active Alarm-S blocks, max. 4250; Simultaneously active alarm_S/SQ blocks or alarm_D/DQ blocks Yes Number of instances for alarm 8 and S7 communication blocks, max. • preset, max. • preset, max. Process control messages Number of archives that can log on simultaneously (SFB 37 AR_SEND) Number of messages • overall, max. • in 100 ms grid, max. • in 500 ms grid, max. 256 • with 100 ms grid, max. 0 with 100 ms grid, max. 0 with 100 ms grid, max.		0
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SCAN procedure Program alarms Yes Process diagnostic messages Simultaneously active Alarm-S blocks, max. Alarm 8-blocks Number of instances for alarm 8 and S7 communication blocks, max. Process control messages Number of archives that can log on simultaneously (SFB 37 AR_SEND) Number of messages o overall, max. in 100 ms grid, max. 256 in 1000 ms grid, max. 256 Number of additional values with 100 ms grid, max. 0 o with 100 ms grid, max.	Number of login stations for message functions, max.	
Process diagnostic messages simultaneously active Alarm-S blocks, max. Alarm 8-blocks Number of instances for alarm 8 and S7 communication blocks, max. preset, max. precess control messages Number of archives that can log on simultaneously (SFB 37 AR_SEND) Number of messages o overall, max. in 100 ms grid, max. in 1000 ms grid, max. 256 Number of additional values with 100 ms grid, max. o o	Symbol-related messages	Yes
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simultaneously active Alarm-S blocks, max. 250; Simultaneously active alarm_S/SQ blocks or alarm_D/DQ blocks Yes Number of instances for alarm 8 and S7 communication blocks, max. preset, max. preset, max. 150 Process control messages Number of archives that can log on simultaneously (SFB 37 AR_SEND) Number of messages overall, max. in 100 ms grid, max. in 500 ms grid, max. 256 in 1000 ms grid, max. 256 with 100 ms grid, max. 256 Number of additional values with 100 ms grid, max.	Program alarms	Yes
Alarm 8-blocks Number of instances for alarm 8 and S7 communication blocks, max. preset, max. precess control messages Number of archives that can log on simultaneously (SFB 37 AR_SEND) Number of messages overall, max. in 100 ms grid, max. in 500 ms grid, max. in 1000 ms grid, max. with 100 ms grid, max. other in 100 ms grid, max. 256 with 100 ms grid, max. 256 Other in 1000 ms grid, max. 256 Number of additional values with 100 ms grid, max.	Process diagnostic messages	Yes
 Number of instances for alarm 8 and S7 communication blocks, max. preset, max. process control messages Number of archives that can log on simultaneously (SFB 37 AR_SEND) Number of messages overall, max. in 100 ms grid, max. in 500 ms grid, max. in 1000 ms grid, max. in 1000 ms grid, max. win 1000 ms grid, max. win 400 ms grid, max. win 500 ms grid, max. win 500 ms grid, max. o o<!--</td--><td>simultaneously active Alarm-S blocks, max.</td><td>250; Simultaneously active alarm_S/SQ blocks or alarm_D/DQ blocks</td>	simultaneously active Alarm-S blocks, max.	250; Simultaneously active alarm_S/SQ blocks or alarm_D/DQ blocks
blocks, max. • preset, max. 150 Process control messages Number of archives that can log on simultaneously (SFB 37 AR_SEND) Number of messages • overall, max. • in 100 ms grid, max. • in 500 ms grid, max. • in 1000 ms grid, max. • with 100 ms grid, max. • with 100 ms grid, max. 0 0	Alarm 8-blocks	Yes
Process control messages Number of archives that can log on simultaneously (SFB 37 AR_SEND) Number of messages overall, max. in 100 ms grid, max. in 500 ms grid, max. in 1000 ms grid, max. with 100 ms grid, max. output 256 Number of additional values with 100 ms grid, max.		300
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AR_SEND) Number of messages • overall, max. 256 • in 100 ms grid, max. 0 • in 500 ms grid, max. 256 • in 1000 ms grid, max. 256 Number of additional values • with 100 ms grid, max. 0	·	Yes
 overall, max. in 100 ms grid, max. in 500 ms grid, max. in 1000 ms grid, max. in 1000 ms grid, max. with 100 ms grid, max. with 100 ms grid, max. 	AR_SEND)	4
 in 100 ms grid, max. in 500 ms grid, max. in 1000 ms grid, max. 256 Number of additional values with 100 ms grid, max. 0 		
in 500 ms grid, max. in 1000 ms grid, max. 256 Number of additional values with 100 ms grid, max. 0	• overall, max.	256
in 1000 ms grid, max. 256 Number of additional values with 100 ms grid, max. 0	• in 100 ms grid, max.	0
Number of additional values • with 100 ms grid, max. 0	• in 500 ms grid, max.	256
• with 100 ms grid, max. 0	in 1000 ms grid, max.	256
	Number of additional values	
• with 500, 1000 ms grid, max. 1	• with 100 ms grid, max.	0
	• with 500, 1000 ms grid, max.	1

Test commissioning functions	
Status block	Yes; Up to 16 simultaneously
Single step	Yes
Number of breakpoints	16
Status/control	
Status/control variable	Yes; Up to 16 variable tables
Variables	Inputs/outputs, memory bits, DBs, distributed I/Os, timers, counters
Number of variables, max.	70; Status/control
Forcing	ro, otatus/control
• Forcing	Yes
Forcing, variables	Inputs/outputs, bit memories, distributed I/Os
Number of variables, max.	64
Diagnostic buffer	07
• present	Yes
Number of entries, max.	3 200
	Yes
— adjustable	120
— preset Service data	120
• can be read out	Yes
	100
Standards, approvals, certificates	Von
CE mark	Yes
CSA approval	Yes
UL approval	Yes
cULus	Yes
FM approval	Yes
RCM (formerly C-TICK)	Yes
KC approval	Yes
EAC (formerly Gost-R)	Yes
Use in hazardous areas	
• ATEX	ATEX II 3G Ex nA IIC T4 Gc
Ambient conditions	
Ambient temperature during operation	
• min.	0 °C
• max.	60 °C
configuration / header	
Configuration software	
• STEP 7	Yes
configuration / programming / header	
Command set	see instruction list
 Nesting levels 	7
 Access to consistent data in process image 	Yes
• System functions (SFC)	see instruction list
System function blocks (SFB)	see instruction list
Programming language	
— LAD	Yes
— FBD	
—166	Yes
— STL	Yes Yes
— STL — SCL	Yes Yes
— STL	Yes
— STL — SCL — CFC — GRAPH	Yes Yes
— STL — SCL — CFC	Yes Yes Yes
— STL — SCL — CFC — GRAPH — HiGraph® configuration / programming / number of simultaneously active	Yes Yes Yes Yes Yes
— STL — SCL — CFC — GRAPH — HiGraph®	Yes Yes Yes Yes Yes
— STL — SCL — CFC — GRAPH — HiGraph® configuration / programming / number of simultaneously active	Yes Yes Yes Yes Yes Yes Yes Yes
— STL — SCL — CFC — GRAPH — HiGraph® configuration / programming / number of simultaneously active — DPSYC_FR	Yes Yes Yes Yes Yes Yes Yes Yes SFC / header 2; SFC 11; per interface
— STL — SCL — CFC — GRAPH — HiGraph® configuration / programming / number of simultaneously active — DPSYC_FR — D_ACT_DP	Yes Yes Yes Yes Yes Yes Yes SFC / header 2; SFC 11; per interface 8; SFC 12; per interface
— STL — SCL — CFC — GRAPH — HiGraph® configuration / programming / number of simultaneously active — DPSYC_FR — D_ACT_DP — RD_REC	Yes Yes Yes Yes Yes Yes Yes Yes SFC / header 2; SFC 11; per interface 8; SFC 59; per interface
- STL - SCL - CFC - GRAPH - HiGraph® configuration / programming / number of simultaneously active - DPSYC_FR - D_ACT_DP - RD_REC - WR_REC	Yes Yes Yes Yes Yes Yes Yes SFC / header 2; SFC 11; per interface 8; SFC 12; per interface 8; SFC 59; per interface 8; SFC 58; per interface
- STL - SCL - CFC - GRAPH - HiGraph® configuration / programming / number of simultaneously active - DPSYC_FR - D_ACT_DP - RD_REC - WR_REC - WR_PARM	Yes Yes Yes Yes Yes Yes Yes SFC / header 2; SFC 11; per interface 8; SFC 12; per interface 8; SFC 59; per interface 8; SFC 59; per interface 8; SFC 55; per interface

— RDSYSST	8; SFC 51
— DP_TOPOL	1; SFC 103; per interface
configuration / programming / number of simultaneously active SFB / header	
— RDREC	8; SFB 52; per interface, but not more than 32 across all external interfaces
— WRREC	8; SFB 53; per interface, but not more than 32 across all external interfaces
Know-how protection	
 User program protection/password protection 	Yes
 Block encryption 	Yes; With S7 block Privacy
Dimensions	
Width	25 mm
Height	290 mm
Depth	219 mm
Weights	

last modified:

4/25/2024