IEC 61850 certified Rugged Substation Automation PC

The Welotec RSAPC is the most modern PC for substation automation, offering state of the art interfaces and unparalleled computing power. This makes it the ideal platform for virtualisation tasks.
The RSAPC comes with an extended I/O feature set, that includes most commonly used I/O ports in the base system, and hence eliminating the need to use PCIe extension ports for those expansions in most applications. With build in iAMT remote management functions and an on board TPM 2.0 module the RSAPC provides both, modern administration and security tools.

- IEC 61850-3 certified
- Fanless 19 inch 3U rackmount industrial pc
- -40 to +75 °C operating temperature range with integrated heating
- Intel Xeon CPU with four cores/eight threats (Kaby Lake, 7. Generation)
- TPM 2.0 module
- Two Hot Swap drive bays for 2.5" SSD/HDD
- Intel CM238 Chipset with Support for RAID1/RAID0
- Load sharing, hot swappable, redundant AC/DC power supplies
- 4x Gigabit RJ45 LAN ports
- 4x USB 3.0 (rear), 1x USB 3.0 (front, with KeyLock), 1x USB 3.0 internal for USB dongles.
- 2x RS-232/422/485 isolated serial ports
- DB9 IRIG-B timing input
- Relay port
- Programable front LED
- DVI-D and Display Port for independent digital displays
- 4x PCIe Extension Slots

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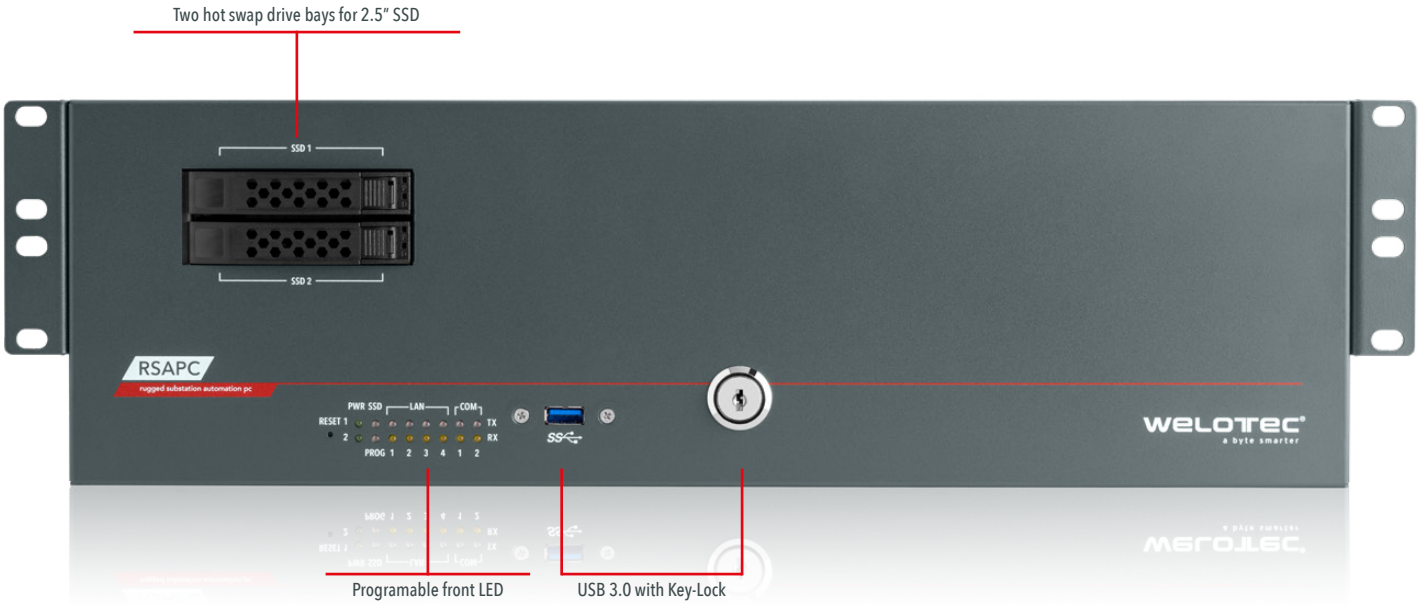

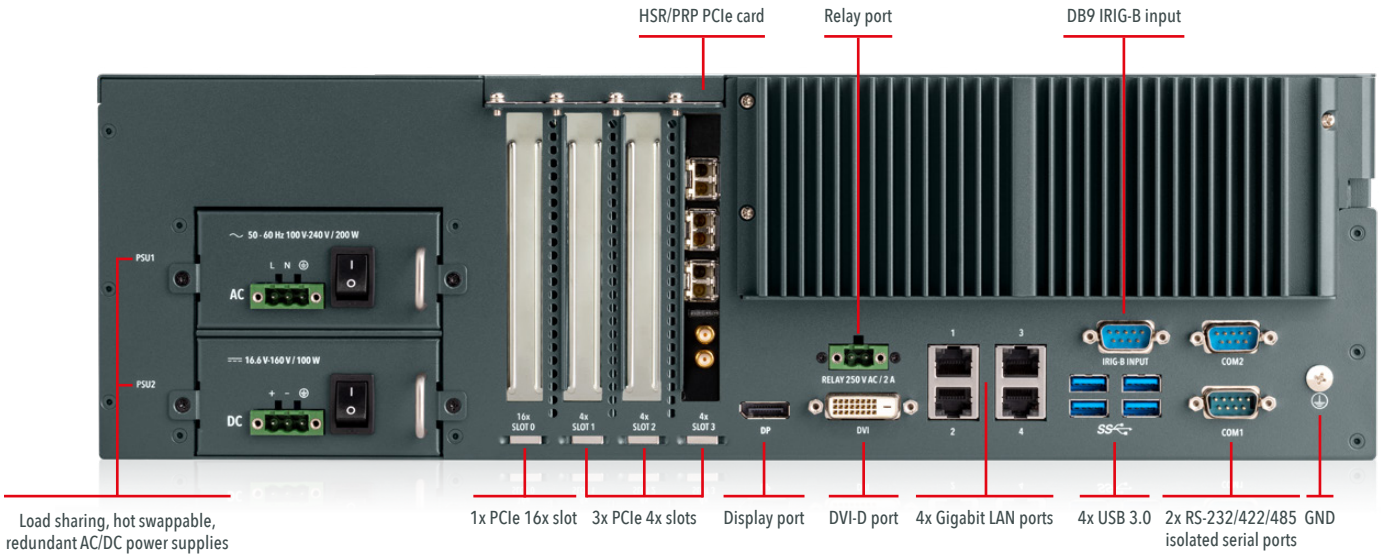

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GENERAL DATA	
Type	19 inch Fanless Rackmount IPC
Series	Rugged Substation Automation PC
Supported Operating Systems	Windows Server 2016 Windows Server 2016 Datacenter Windows 10 Professional Windows 10 IoT Enterprise 2016 LTSB Windows 10 IoT Enterprise 2019 LTSC Linux Ubuntu
CPU	
CPU	Intel® Xeon® Processor E3-1505L v6
Generation	Kaby Lake, 7. Generation
Available till	2032
Frequency / Frequency max.	2,2 GHz / 3,0 GHz
Cores / Threads	4 Cores / 8 Threads
L2 cache	8 MB
Passmark CPU Perfomance	~7800
MEMORY / RAM	
Socket type	2x SO-DIMM 1,2 V
Storage type	DDR4 ECC (2133 MHz)
Capacity	max. 64 GB
CHIPSET	
Chipset	Intel CM238 Chipset
MASS STORAGE	
mSATA Socket	1x Full Size Socket (max. 512 GB)
Internal Drive Bay	2x 2.5 inch SATA HDD/SSD Hot Swappable Bay
SATA Controller	Intel CM238 SATA Controller provides standard AHCI and Intel RST RAID modes
Interface for Bays	SATA II 3.0 Gb/s
RAID	RAID Level 0, 1, 5, 10
GRAPHICS	
Graphic chip (GPU)	Intel® HD P630 Graphics Controller
Direct X Level	Level 12
OpenGL	4.4
Displays	DVI-D (max. 1920 x 1200 @ 60 Hz) DisplayPort 1.2 (max. 4096 x 2304 @ 60 Hz)

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INTERFACES & FEATURES	
USB	5x USB 3.0 (4x rear, 1x front with key lock) + 1x internal USB 3.0 onboard Type A
PCIe Expansion	1x PCIe x16 slot, full length, full height 4x PCIe x16 slot, full length, full height
Serial Ports	2x RS-232/422/485 (DB9 with isolation)
Ethernet	4x RJ45 10/100/1000 Mbps copper ports, Intel® Ethernet-Controller I210-IT
Time-Code Input/Output	Main Board (Input only) • 1 x TTL RS-232 support IRIG-B with isolation • connector: COM1 DB-9 serial port • Time-code: Demodulated IRIG-B TTL compatible
Real-Time Clock/Calendar	3V 230mA PANASONIC CR2032L-JP-W-1A
BIOS	AMI UEFI
Trusted Platform Module	Infineon SLB9665XT2.0 TPM2.0
POWER SUPPLY	
Power supply	2x slots for power supply unit modules
Fuse Ratings	AC 5 A / 25 V DC T15 A / 400 V 5 HP
Terminal Connections	Current rating: 16 A, 300 V AC Insulation withstands volt: 2000 V AC min Insulation resistance: > 2000 M Ω 500 V DC Operation temperature: -40° C to +105° C Wire strip length: 4 mm to 5 mm Wire range: 12 to 24 AWG Screw torque: 0.8 Nm (7 in-lb)
PHYSICAL CHARACTERISTICS	
Housing colour	Pantone® Gray 446
Dimensions (W x H x D)	438 x 129 x 292 mm
Weight	8500 g
Mounting	19" Rack
ENVIRONMENTAL	
Operating temperature range	-40 to +75 °C
Storage temperature range	-40 to +85 °C
Humidity	5 % to 95 % @ 40 °C
Insulation Class	Class 1
APPROVALS	
CE	Yes
FCC	Yes
RoHS	Yes
UL/cUL	Yes
IEC-61850-3	Yes
IEEE-1613	Yes
CB	Yes

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AC POWER SUPPLY UNIT	
AC Input Range	100 – 240 V AC
DC Output Range	12 V DC
Frequency Range	50 – 60 Hz
Power Factor	> 0.9 (at full load)
DC Ripple	< 15% Rated Voltage
Peak Inrush	Peak 100 A
Isolation Voltage Input to Output	3000 V AC

DC POWER SUPPLY UNIT	
DC Input Range	16.6 – 160 V DC, 6.95 – 0.69 A
DC Output Range	+12 V DC / 8.3 A, total max. 100W
DC Ripple	< 10 % Rated Voltage
Peak Inrush	Peak 27 A at nominal 110 V DC
Isolation Voltage Input to Output	3000 V AC
Safety Conformity	IEC 60950-1:2005/AMD1:2009 IEC 60950-1:2005/AMD2:2013 IEC 60950-1:2005 IEC 62368-1:2014 (additionally evaluated to EN 62368-1:2014/A11:2017)

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STANDARD	TESTING CONDITION	CRITERIA
Radiated emission	Class A limit	Class A
Conducted emission	Class A limit	Class A
IEC 61000-4-2 **Electrostatic discharge**	Air: ±8 kV, Contact: ±6 kV	Class 1
IEC 61000-4-3 **Radio frequency electro magnetic field**	80 – 3000 MHz 10 V/m, 80 % AM, 1 kHz	Class 1
IEC 61000-4-4 **Fast transient burst**	AC: ± 4 kV	Class 1
	DC: ± 4 kV	
	IO: ± 4 kV	
	(IO port: LAN / RS-232 / RS-485 ports)	
	Earth Ground: ± 4 kV	
	Repetition Rate: 5 KHz	
IEC 61000-4-5 **High energy surge**	AC: C.M. Mode ± 4 kV, D.F.Mode ± 2 kV @ 1.2/50	Class 1
	DC: C.M. Mode ± 2 kV, D.F.Mode ± 1 kV @ 1.2/50	
	IO: C.M. Mode ± 4 kV @ 1.2/50	
	(IO port: LAN / RS-422 / RS-485 ports)	
IEC 61000-4-6 **Conduced Disturbance**	0.15 to 80 MHz, 80 % AM, 1 kHz	Class 1
	AC: 10 V	
	DC: 10 V	
	IO: 10 V	
	(IO port: LAN / RS-422 / RS-485 ports)	
IEC 61000-4-8 **Power frequency magnetic fields**	100 A/m continuous, 1000 A/m for 1 s	Class 1
IEC 61000-4-11 **Voltage dips and interruption power ports(AC)** **(For AC PSU only)**	DIP 30 %, 1 period	Class 1
	DIP 60 %,50 period	
	Interruption 100 %, 5 period	
	Interruption 100 %, 50 period	
IEC 61000-4-16 **Mains frequency voltage**	DC: Main freq: Continuous (r.m.s): 30 V Main freq: Short duration (r.m.s): 300 V (1 s)	Class 1
	IO:	
	Main freq: Continuous (r.m.s):30V	
	Main freq: Short duration (r.m.s):300V(1s)	
	(IO port: LAN / RS-422 / RS-485 ports)	
IEC 61000-4-17 **Ripple on d.c. power supply**	10 % of Un	Class 1
IEC 61000-4-18 **Damped oscillatory wave**	AC: Differential: ± 1 kV, Common: ± 2.5 kV	Class 1
	DC: Differential: ± 1 kV, Common: ± 2.5 kV	
	IO: Differential: ±1 kV, Common: ± 2.5 kV	
	(IO port: LAN / RS-422 / RS-485 ports)	

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IEC 61000-4-29 Voltage dips and interruption power ports(DC) (For DC PSU only)	Dip 30 % for 0,1 s	Class 1
	Dip 60 % for 0,1 s	
	Interruption 100 % for 0,05 s	
DC rated control power inputs (For DC PSU only)	80 % of rated supply voltage	Class 1
	100 % of rated supply voltage	
	110 % of rated supply voltage	

/RUGGED SUBSTATION AUTOMATION PC
IEEE 1613

STANDARD	TESTING CONDITION	CRITERIA
IEEE C37.90 DC rated control power inputs	80 % of rated voltage	Class 1
	100 % of rated voltage	
	Maximum design voltage	
IEEE C37.90 Allowable AC component in DC control voltage supply	ripple 5 %	Class 1
IEEE C37.90 AC rated control power inputs	85 % of rated supply voltage	Class 1
	100 % of rated supply voltage	
	110 % of rated supply voltage	
IEEE C37.90.1 Oscillatory waveform (Similar to IEC 61000-4-18)	AC: Differential: ± 2.5 kV, Common: ± 2.5 kV	Class 1
	DC: Differential:± 2.5 kV, Common:± 2.5 kV	
	IO: Differential:± 2.5 kV, Common:± 2.5 kV	
	IO:LAN / RS-422 / RS-485	
IEEE C37.90.1 Fast transient test waveform (Similar to IEC 61000-4-4)	AC: ± 4 kV	Class 1
	DC: ± 4 kV	
	IO: ± 4 kV	
	5 kHz	
	IO: LAN / RS-422 / RS-485	
IEEE C37.90.2 RF susceptibility tests (Similar to IEC 61000-4-3)	80 – 1000 MHz 20V/m, PM and AM	Class 1
IEEE C37.90.3 Electrostatic discharge tests (Similar to IEC 61000-4-2)	Air: ± 15 kV, Contact: ± 8 kV	Class 1

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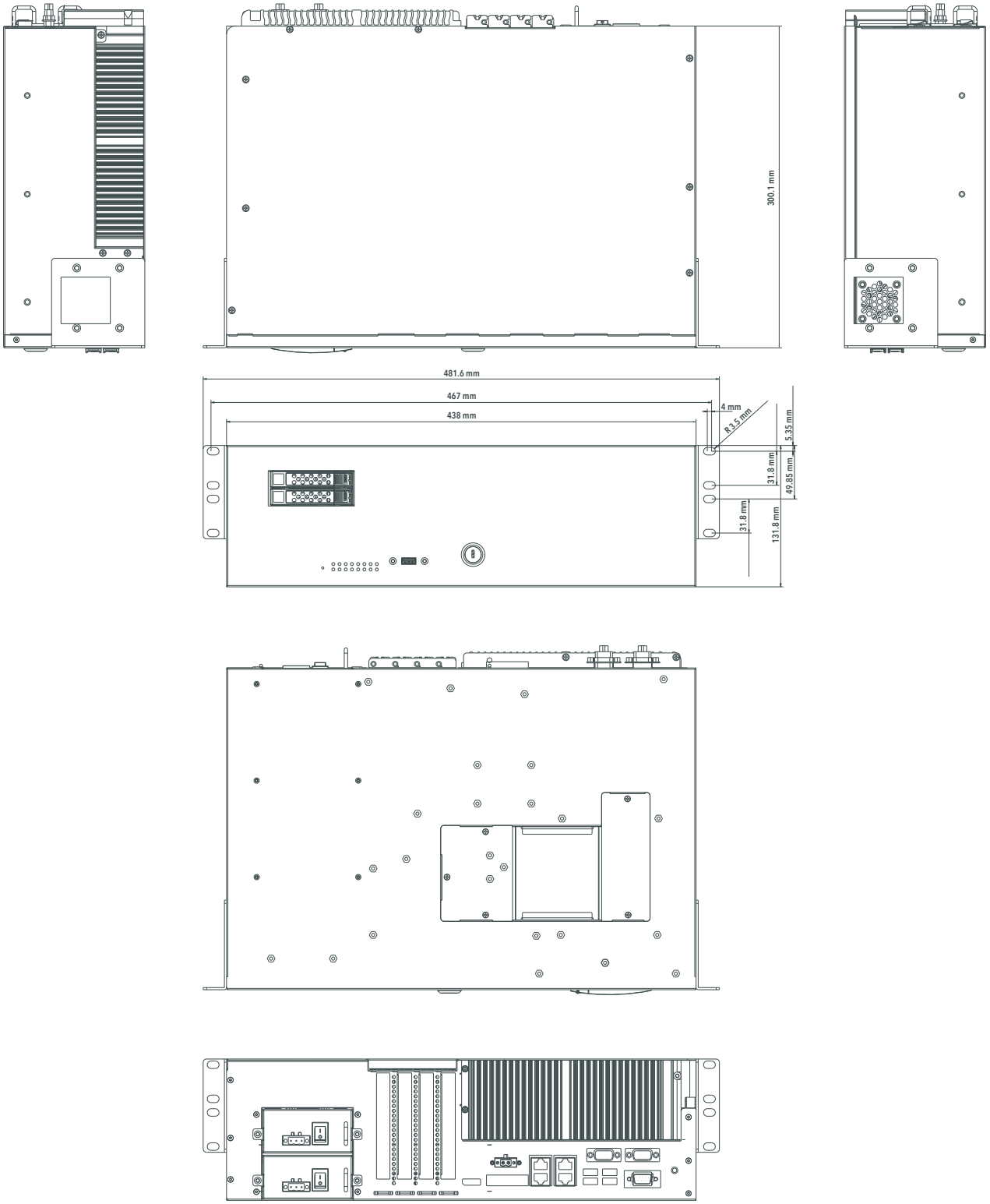

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The RSAPC offers two 2.5 inch hot swap slots for SSDs in a RAID1 disk array. Furthermore there is a mSATA slot for a dedicated boot media.

2.5 inch MLC (Multi-Level-Cell) SSD

Multi-Level-Cell flash memory costs less and allows for higher storage density and is suitable for most application. MLC memory endurance is rated for up to 3.000 cycles.

Capacity	Type	Size	Temperature	Technology	Datarate read	Datarate write
64 GB	MLC type	2.5 inch	wide temperature	*iCell	520 MB/s read	180 MB/s write
128 GB	MLC type	2.5 inch	wide temperature	*iCell	520 MB/s read	300 MB/s write
256 GB	MLC type	2.5 inch	wide temperature	*iCell	520 MB/s read	350 MB/s write
512 GB	MLC type	2.5 inch	wide temperature	*iCell	520 MB/s read	450 MB/s write
1 TB	MLC type	2.5 inch	wide temperature	*iCell	520 MB/s read	450 MB/s write

2.5 inch and mSATA iSLC SSD

iSLC is innodisks exclusive technology designed to ensure longer-lasting and more reliable performance than conventional MLC NAND flash. Through the use of flash management algorithms, iSLC improves SSD endurance up to 20.000 cycles and is suitable for write intensive applications.

Capacity	Type	Size	Temperature	Technology	Datarate read	Datarate write
64 GB	iSLC type	2.5 inch / mSATA	wide temperature	*iCell	445 MB/s read	250 MB/s write
128 GB	iSLC type	2.5 inch / mSATA	wide temperature	*iCell	450 MB/s read	260 MB/s write
256 GB	iSLC type	2.5 inch / mSATA	wide temperature	*iCell	435 MB/s read	205 MB/s write

2.5 inch SLC (Single-Level-Cell) SSD

Single-Level-Cell flash memory is the most reliable and has the longest endurance rating with up to 100.000 cycles. SLC based flash drives are suitable for extremly write intensive applications.

Capacity	Type	Size	Temperature	Technology	Datarate read	Datarate write
64 GB	SLC type	2.5 inch	wide temperature	*iCell	TBD	TBD
128 GB	SLC type	2.5 inch	wide temperature	*iCell	TBD	TBD
256 GB	SLC type	2.5 inch	wide temperature	*iCell	TBD	TBD
512 GB	SLC type	2.5 inch	wide temperature	*iCell	TBD	TBD

*iCell Technology

Innodisk's iCell Technology ensures that DRAM-based solid state drive (SSD) can protect mission critical data and prevent data loss during an unexpected power failure. This is achieved by integrated iCells delivering an instantaneous charge to the SSD to make sure the data is safely stored.

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The RSAPC offers two SoDIMM slots for up to 64GB ECC protected RAM. We only use industrial grade wide temperature DDR4 2400 MHz memory.

Capacity	Type	Temperature	Channels
4 GB	DDR4 ECC	wide temperature	1x 4 GB, Single Channel
8 GB	DDR4 ECC	wide temperature	2x 4 GB, Dual Channel
16 GB	DDR4 ECC	wide temperature	2x 8 GB, Dual Channel
32 GB	DDR4 ECC	wide temperature	2x 16 GB, Dual Channel
64 GB	DDR4 ECC	wide temperature	2x 32 GB, Dual Channel

The RSPACs four PCIe Expansion slots allow to tailor the available I/O to the project. One slot is PCIe x16, supports PCIe 3.0 and is suited for all PCIe expansion cards. The other three PCIe x4 slots support PCIe 3.0 and are suited for all x1 and x4 PCIe expansion cards.

Network cards

Capacity	Type
2 Port Gigabit Ethernet RJ45 network expansion card	isolated RJ45 RTL8111E PCI-Ex4
4 Port Gigabit Ethernet Fiber network expansion card	Intel i350AM2, MMF 62.5/50um, up to 137m LC, PCIe x4

Fieldbus cards

Capacity	Type
16 Port RS-232/422/485 expansion card	4k Surge Protection, 921.6 kbps max. baudrate, 128 Byte FiFo, including DB9 cable
2 Port CANbus card	CANbus serial PCIe board with DB9 (male)
PRP/HSR card	Time Aware PRP/HSR 2 Port Gigabit Ethernet, 1x Gigabit SFP, compatible with IEC62439-3, Clause 4 & 5, 1x PPS Output

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RSAPC- [ ][ ][ ][ ][ ] - [ ][ ][ ][ ][ ][ ][ ][ ]

Processor
- 1 Barebone with Xeon E3-1505L v6 (4C/8T, 2.2 (3.0) GHz, 8MB Cache)
- 2 Barebone with Xeon E3-1505L v6 (4C/4T, 2.2 GHz, 8MB Cache)

Drives Slot 1
- A 64 GB MLC type, wide temperature, *iCell
- B 128 GB MLC type, wide temperature, *iCell
- C 256 GB MLC type, wide temperature, *iCell
- D 512 GB MLC type, wide temperature, *iCell
- E 1 TB MLC type, wide temperature, *iCell
- J 64 GB iSLC type, wide temperature, *iCell
- K 128 GB iSLC type, wide temperature, *iCell
- L 256 GB iSLC type, wide temperature, *iCell
- Q 64 GB SLC type, wide temperature
- R 128 GB SLC type, wide temperature
- S 256 GB SLC type, wide temperature
- T 512 GB SLC type, wide temperature
- 1 128 GB TLC type, wide temperature
- 2 256 GB TLC type, wide temperature
- 3 512 GB TLC type, wide temperature
- 4 1TB TLC type, wide temperature
- X without drive

Drives Slot 2
- A 64 GB MLC type, wide temperature, *iCell
- B 128 GB MLC type, wide temperature, *iCell
- C 256 GB MLC type, wide temperature, *iCell
- D 512 GB MLC type, wide temperature, *iCell
- E 1 TB MLC type, wide temperature, *iCell
- J 64 GB iSLC type, wide temperature, *iCell
- K 128 GB iSLC type, wide temperature, *iCell
- L 256 GB iSLC type, wide temperature, *iCell
- Q 64 GB SLC type, wide temperature
- R 128 GB SLC type, wide temperature
- S 256 GB SLC type, wide temperature
- T 512 GB SLC type, wide temperature
- 1 128 GB TLC type, wide temperature
- 2 256 GB TLC type, wide temperature
- 3 512 GB TLC type, wide temperature
- 4 1TB TLC type, wide temperature
- X without drive

mSATA Drive
- A 64 GB SSD, iSLC type, wide temperature, *iCell
- B 128 GB SSD, iSLC type, wide temperature, *iCell
- C 256 GB iSLC type, wide temperature, *iCell
- D 32 GB SSD, iSLC type, wide temperature, *iCell
- X without mSATA Drive

Main Memory (RAM)
- 1 4 GB DDR4 ECC wide temperature (1x 4 GB), Single Channel
- 2 8 GB DDR4 ECC wide temperature (2x 4 GB), Dual Channel
- 3 16 GB DDR4 ECC wide temperature (2x 8 GB), Dual Channel
- 4 32 GB DDR4 ECC wide temperature (2x 16 GB), Dual Channel
- 5 64 GB DDR4 ECC wide temperature (2x 32 GB), Dual Channel
- 0 without RAM

PCIe Expansion Slot 3 (4x)
- 1 2 Port Gigabit Ethernet RJ45 network expansion card - isolated RJ45 RTL8111E PCI-Ex4
- 2 4 Port Gigabit Ethernet Fiber network expansion card - Intel i350AM2, MMF 62.5/50um, up to 137m LC, PCIe x4
- 3 16 Port RS-232/422/485 serial expansion card - 4k surge protection, 921.6 kbps max. baudrate, 128 Byte FiFo, including DB9 cable
- 5 PRP/HSR card - Time Aware PRP/HSR 2 Port Gigabit Ethernet, 1x Gigabit SFP, compatible with IEC62439-3, Clause 4 & 5, 1x PPS Output, including 2x SFP modules (fiber or copper)
- 0 without Expansion Card

PCIe Expansion Slot 2 (4x)
- 1 2 Port Gigabit Ethernet RJ45 network expansion card - isolated RJ45 RTL8111E PCI-Ex4
- 2 4 Port Gigabit Ethernet Fiber network expansion card - Intel i350AM2, MMF 62.5/50um, up to 137m LC, PCIe x4
- 3 16 Port RS-232/422/485 serial expansion card - 4k surge protection, 921.6 kbps max. baudrate, 128 Byte FiFo, including DB9 cable
- 5 PRP/HSR card - Time Aware PRP/HSR 2 Port Gigabit Ethernet, 1x Gigabit SFP, compatible with IEC62439-3, Clause 4 & 5, 1x PPS Output, including 2x SFP modules (fiber or copper)
- 0 without Expansion Card

PCIe Expansion Slot 1 (4x)
- 1 2 Port Gigabit Ethernet RJ45 network expansion card - isolated RJ45 RTL8111E PCI-Ex4
- 2 4 Port Gigabit Ethernet Fiber network expansion card - Intel i350AM2, MMF 62.5/50um, up to 137m LC, PCIe x4
- 3 16 Port RS-232/422/485 serial expansion card - 4k surge protection, 921.6 kbps max. baudrate, 128 Byte FiFo, including DB9 cable
- 5 PRP/HSR card - Time Aware PRP/HSR 2 Port Gigabit Ethernet, 1x Gigabit SFP, compatible with IEC62439-3, Clause 4 & 5, 1x PPS Output, including 2x SFP modules (fiber or copper)
- 0 without Expansion Card

PCIe Expansion Slot 0 (16x)
- 1 2 Port Gigabit Ethernet RJ45 network expansion card - isolated RJ45 RTL8111E PCI-Ex4
- 2 4 Port Gigabit Ethernet Fiber network expansion card - Intel i350AM2, MMF 62.5/50um, up to 137m LC, PCIe x4
- 3 16 Port RS-232/422/485 serial expansion card - 4k surge protection, 921.6 kbps max. baudrate, 128 Byte FiFo, including DB9 cable
- 5 PRP/HSR card - Time Aware PRP/HSR 2 Port Gigabit Ethernet, 1x Gigabit SFP, compatible with IEC62439-3, Clause 4 & 5, 1x PPS Output, including 2x SFP modules (fiber or copper)
- 0 without Expansion Card

Operating Systems (pre-installed and activated)
- A Microsoft Windows Server 2016 Standard P73-07134
- B Microsoft Windows Server 2016 Datacenter DE P71-08672
- C Microsoft Windows 10 Professional DE FQC-08922
- D Microsoft Windows 10 IoT Enterprise 2016 LTSB 6EU-00034
- E Microsoft Windows 10 IoT Enterprise 2019 LTSC MUT-00013
- F Linux Ubuntu 18.04 LTS
- G Installation of customer supplied OS Image
- H Without License - Microsoft Windows 10 Professional DE FQC-08922
- I Without License - Microsoft Windows 10 IoT Enterprise 2016 LTSB 6EU-00034
- J Without License - Microsoft Windows 10 IoT Enterprise 2019 LTSC MUT-00013
- K Without License - Microsoft Windows Server 2016 Standard P73-07134
- L Without License - Microsoft Windows Server 2016 Datacenter DE P71-08672
- X without Operating System

Power supply units
- 1 1x AC power supply unit (50 - 60 Hz / 100-240 V AC / 200 W)
- 2 1x DC power supply unit (16.6-160 V DC / 100 W)
- 3 2x AC power supply units (50 - 60 Hz / 100-240 V AC / 200 W)
- 4 2x DC power supply units (16.6-160 V DC / 100 W)
- 5 1x AC (50 - 60 Hz / 100-240 V AC / 200 W) and 1x DC (16.6-160 V DC / 100 W) power supply unit

Country-specific power cords (AC only)
- 1 Power cord Europe, CEE 7/7 Connector
- 2 Power cord China, YP-03/YC-12 Connector
- 3 Power cord USA, NEMA 5 connector
- 0 without power cord

Test report
- A Test report as paper printout
- B Test report as PDF send via e-mail
- C without test report