TESVOLT

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TECHNICAL DATA SHEET

TESVOLT ENERGY MANAGER
KC4S

TECHNICAL DATA FOR ENERGY MANAGER

Casing dimensions (H x W x D)	96 x 45 x 110.5 mm
Casing variant	Top-hat rail casing (for top-hat rail variant EN 50022)
Casing material	Plastic
Weight	Approx. 197 g/224 g (incl. plug)
Protection class	IP20
Power supply	12–24 V DC -15%/+20%, protected against reverse polarity
Maximum power consumption	20 W (incl. 1 A total USB output current)[1]
Permissible operating temperature	-25°C to +55°C
Permissible storage temperature	-40°C to +85°C
Max. relative humidity (at 40°C)	93% (non-condensing)
Interfaces	2 x USB A (total power draw from both jacks max. 1 A) [2] 2 x RJ45 10/100 Ethernet (with independent MAC addresses) 1 x RS485 screw terminal connection (not galvanically isolated) 1 x micro USB jack (exclusively for image transfer to eMMC) 1 x micro HDMI 2.0a (4K) 1 x PiBridge system bus 1 x ConBridge system bus
Plug-in connectors	1 x 4-pin screw connector for relay contact and signal input 1 x 4-pin screw connector for power supply
Processor	Broadcom BCM2711 with quad core processor ARM Cortex-A72
Frequency	1.5 GHz
Processor cooling	Passive heat sink
RAM	1 GB LPDDR4
Flash storage	8 GB
Number of digital inputs	1
Type of digital input	24 V control voltage (e.g. for power good signal from a UPS)
Input threshold	Approx. 3.0 V (0 -> 1) and/or 2.3 V (1 -> 0)
Input protection	Against overvoltage, negative voltages
Number of digital outputs	1
Type of output	Relay contact, approval up to 30 V switching voltage (e.g. for power supply to a router)
Maximum power load of the contact	2 A @ 30 V DC (resistive load!)
Software connection for the input and output	Via GPIOs and process image. Output is also optionally switched by hardware watchdog.
Hardware watchdog function	Can be deactivated using jumper on the 4-pin screw connector. Reset by toggling a GPIO or alternatively a bit in the process image.
Hardware watchdog interval	Trigger after approx. 60 seconds without toggling the reset bit.
Compatible modules for system expansion	All RevPi IO modules and RevPi gateway modules can be connected via the PiBridge system bus. All RevPi Con modules can be connected via the ConBridge system bus.
ESD protection	4 kV/8 kV (in accordance with EN61131-2 and IEC 61000-6-2)
EMI checks	Passed (in accordance with EN61131-2 and IEC 61000-6-2)
Surge/burst checks	Passed (in accordance with EN61131-2 and IEC 61000-6-2)
Buffer time RTC	Min. 24 h
Optical indicators	6 status LEDs (2 colours), of which 2 LEDs freely programmable
Compliance	CE, RoHS

1   The average power consumption without USB load varies widely and is dependent on the use of the interfaces, the GPU and the CPU. Without HDMI it is generally well under 4 W. A USB output current (total of both USB outputs) is only available with input voltages >11 V.
2   The bridging time of voltage dips of at least 10 ms required by EN 61131-2 is only guaranteed with a supply of 20.4 to 28.8 V. With a 12 V supply this time is significantly reduced, especially when power is drawn from the USB jacks.

TECHNICAL DATA FOR DIO MODULE

Casing dimensions (H x W x D)	96 x 22.5 x 110.5 mm
Casing variant	Top-hat rail casing (for top-hat rail variant EN 50022)
Casing material	Plastic
Weight	Approx. 100 g/130 g (incl. plug)
Protection class	IP20
Power supply	12–24 V DC -5%/+20% (X2 and X4) [3]
Maximum power consumption	1.5 W (X4/main supply)
Permissible operating temperature	-40°C to +55°C
Permissible storage temperature	-40°C to +85°C
Max. relative humidity (at 40°C)	93% (non-condensing)
Plug-in connectors	2 x 4-pin screw connectors for power supply 2 x 14-pin spring-cage plug-in connectors (0.2–1.5 mm²) for IOs, width 3.5 mm (Wieland article no. 27.630.4453.0)
Optical indicators	3 x multi-coloured status LEDs
Number of digital inputs	14 (expandable with additional DIO modules)
Type of inputs	Galvanically isolated from the system bus and from the outputs, individually configurable as direct digital input, counter on rising edge, counter on falling edge or combined with adjacent input as encoder.[4]
Current limit on the inputs	2.4 mA (with 24 V power supply)
Input thresholds	With 24 V compatible with type I and III sensors in accordance with EN 61131-2.
Input protection	In accordance with EN 61131-2 (IEC 61000-4-4, -6) against bursting, HF interference, external voltages from -3 V to +36 V
Digital debounce circuit	Adjustable for all inputs together: off, 25 µs, 750 µs or 3 ms
Alarm	For auxiliary voltages below 19 V and below 9 V, overtemperature
Maximum frequency resolution of the counter inputs	2 kHz (corresponding to 500 Hz encoder sequence)
Number of digital outputs	14 (expandable with additional DIO modules)
Type of outputs	Galvanically isolated from the system bus and from the inputs, individually configurable as direct digital output with high-side or push-pull drivers and as PWM output.[5]
PWM frequency	Selectable for all outputs together: 40 Hz, 80 Hz, 160 Hz, 200 Hz, 400 Hz
Maximum current per output	500 mA (high-side mode), 100 mA (push-pull mode)
PWM frequency	Selectable for all outputs together: 40 Hz, 80 Hz, 160 Hz, 200 Hz, 400 Hz [6]
Alarm	Thermal shut down or short circuit of the outputs (isolated for each output).
Dual watchdog function	In the case of communication failure with the controller (after 50 ms or 500 ms [7]) or internal communication failure with the CPU (after 9 ms, hardware-driven) outputs are reset to zero.
Output protection	In accordance with EN 61131-2 (IEC 61000-4-4, -5, -6, and -2) against short circuit, overload, bursting and ESD
Compatible modules for system expansion	RevPi base modules and RevPi Gate modules can be connected using a jumper.
Power supply input protection	Protected against reverse polarity, transient overvoltages
EMV electromagnetic interference	In accordance with EN 61000-6-4
EMV immunity	In accordance with EN 61000-6-2
Compliance	RoHS
Marking/label	CE

3   For galvanic isolation of the inputs and outputs, three independent supply voltage sources must be present.
4   A maximum of 6 inputs are definable as 6 counters or 12 inputs as 6 decoders per DIO module. Counters and decoders are stored as 32-bit integers in the process image. Counters/encoders are reset via ioctl calls from the piControl kernel driver.
5   The PWM pulse width is stored in 1 byte as a value from 0 to 100 in the process image. The maximum resolution of the implementation of this value in % by the DIO module is dependent on the PWM frequency:
40 Hz/1%, 80 Hz/2%, 160 Hz/4%, 200 Hz/5%, 400 Hz/10%.
6   The PWM pulse width is stored in 1 byte as a value from 0 to 100 in the process image. The maximum resolution of the implementation of this value in % by the DIO module is dependent on the PWM frequency:
40 Hz/1%, 80 Hz/2%, 160 Hz/4%, 200 Hz/5%, 400 Hz/10%.
7   50 ms for all RevPi DIO with software version 1.4 or older. 500 ms for all RevPi DIO with software version 1.5 or newer.

MATRIX WITH POSSIBLE ENERGY SERVICE COMBINATIONS

BASIC + PRO

	Self-consumption optimisation	Off-grid	PS physical	Back-up power	Zero feed-in	Charging station control (Pro)	Generation control during utility grid operation	Load control	Dynamic peak shaving	Power quality	Forecast-based charging	Semi-off-grid operation*	Micro-grid*	Time of Use	Direct marketer interface*
Direct marketer interface*	1*	N/A	1*	1*	-	1*	1*	1*	1	1*	1*	-	-	1*	
Time of Use	1	1	1	1	1	1	1	1	1	1	1	1	1		1*
Micro-grid*	0	N/A	N/A	N/A	N/A	1*	1	1*	1*	1*	0	1*		1	-
Semi-off-grid operation*	1*	N/A	1*	N/A	N/A	1*	1*	1*	0	1*	1*		1*	1	-
Forecast-based charging	1	0	1	1	0	1	1	1	1	1		1*	0	1	1*
Power quality	1	1	1	1	1	1	1	1	1		1	1*	1*	1	1*
Dynamic peak shaving	1	0	N/A	1	1	1	1	1		1	1	0	1*	1	1*
Load control	1	1	1	1	1	1	1		1	1	1	1*	1*	1	1*
Generation control during utility grid operation	1	0	1	1	1	1		1	1	1	1*	1	1	1	1*
Charging station control (Pro)	1	1	1	1	1		1	1	1	1	1	1*	1*	1	1*
Zero feed-in	1	0	1	1		1	1	1	1	1	1	0	N/A	N/A	1	-
Back-up power	1	0	1		1	1	1	1	1	1	1	1	N/A	N/A	1	1*
PS physical	1	0		1	1	1	1	1	N/A	1	1	1*	N/A	1	1*
Off-grid	0		0	0	0	1	0	1	0	1	0	N/A	N/A	1	N/A
Self-consumption optimisation		0	1	1	1	1	1	1	1	1	1	1*	0	1	1*

BASIC

	Self-consumption optimisation	PS physical	Zero feed-in	Charging station control	Generation control during utility grid operation	Load control
Load control	1	1	1	1	1	
Generation control during utility grid operation	1	1	1	1		1
Charging station control	1	1	1		1	1
Zero feed-in	1	1		1	1	1
PS physical	1		1	1	1	1
Self-consumption optimisation		1	1	1	1	1

1   Combination is possible
0   Combination is not possible
*   Combinations are possible on a project basis
N/A Not applicable
-   Not yet possible to say

Further information on energy services can be found in the product brochure.