

# *D232 and DUSB Communications Specification*

*Plasmatronics*

*Rev 0.3*

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## Overview

The D232 and DUSB provide a communications interface to the Plasmatronic's Dingo product range. The D232 and DUSB conform to the Modbus protocol, with some noted limitations. Complete Modbus protocol specifications are publicly available from: <http://www.modbus.org/specs.php>.

Please note that the DUSB and D232 are powered via the connection to the Dingo.

## Communications Parameters

All communications are **RTU** mode.

As per the Modbus specification, the default communications parameters are:

- 9600 baud
- 8 data bits
- Even parity
- 1 stop bit
- No flow control

The default server (slave) address is 0x08.

Alternate values are supported and are configurable via software settings.

## Changing Communication Parameters

To prevent accidental loss of communications with the device, there is a special procedure to change the slave address, baud rate, parity and stop bits used. Changing these parameters requires two writes. The first will change the active parameter in use. The second is write is done at the new settings to confirm that communications are successful at the new settings.

If the second write is not conducted within 20 seconds the active parameter will revert to the stored value. The active parameter is what is currently in use by the device. The stored parameter is what is kept in non volatile memory. When a register is written with a value matching the active value then that value is stored in persistent memory so that the parameter change is preserved across power cycles.

## Modbus Function Codes

The following function codes are supported:

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Function Code	Comment
0x03	Read Holding Registers <i>A maximum of 16 registers can be read simultaneously.</i>
0x04	Read Input Registers <i>A maximum of 16 registers can be read simultaneously.</i>
0x10	Write multiple registers. <b>EEPROM and RAM only.</b> <i>A maximum of 8 registers can be written simultaneously.</i>
0x2B /0x0E	Read Device Identification – 'Basic' options are supported.

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Function codes 0x03, 0x04 and 0x10 all refer to an identical register space.

## Register Map

The address space is divided into 65535 contiguous registers, each 16bits in size. Register addresses are specified as the PDU address (starting from 0). An address can be either: **Valid, Reserved, Internal, Invalid, Legacy.**

Valid addresses support reads and may support writes. Internal addresses can be read but should not be written to. Reserved address ranges are Any query attempting to read from or write to an invalid address will fail.

Read and write behaviour for Legacy address ranges are undefined and should be avoided.

The available registers are divided into discrete segments. The register address space is partitioned so that these segments are separated and multiple segments cannot be read or written within a single transaction. History data should be read in two day chunks (16 registers at a time, starting address aligned to nearest multiple of 16).

An overview of the segments is shown to the right. Note that only some segments are writable.

Segment	PDU address
LEGACY	0x0000
	0x0FFF
INFO	0x1000
	0x100F
	0x1020
	0x102F
OTHER EXTERNAL DEVICES	0x1040
	0x104F
	0x1200
	0x120D
	0x1210
	0x121D
	0x1220
	0x122D
	0x1230
	0x123D
REMOTE	0x1240
	0x124D
	0x1250
	0x125D
RAM	0x1F21
	0x1F23
	0x1F30
	0x1F35
EEPROM	0x2000
	0x21FF
HISTORY	0x3000
	0x31FF
D232 and DUSB Settings and Info.	0x4000
	0x4FFF
	0x5000
	0x5004
	0x5010
	0x5012
	0x5014
0x5FFF	
Reserved	0x6000
	0x7FFF
Reserved	0x8000
	0xFEFF
LEGACY	0xFF00
	0xFFFF

## Property ID

For ease of reference a label is attributed to some registers.

## Data types

All registers are 16 bits wide, but can have varying representations.

Type	Description
UINT8	Unsigned 8 bit integer. The upper 8 bits can be ignored.
INT8	Signed 8 bit integer, 2's complement format. The upper 8 bits can be ignored.
UINT16	Unsigned 16 bit integer.
INT16	Signed 16 bit integer, 2's complement format.
BITMASK	Treat as UINT16.
ENUM	Enumerated type. Consult the reference manual for meanings of specific values.

## Data Mask

Some registers contain multiple properties within a single register. In such cases a mask of the appropriate bits is specified to show the significant bits. The value itself is shifted the same amount that the mask would need to be shifted so that the lowest set bit of the mask moves into the least significant bit. For example a value with mask of 0xF0 would be shifted 4 times to the right after applying the mask to the data.

## Units and Scaling

Values may have a scaling applied in order to be able to report fractional quantities. Such a value may have units expressed as 'Volts/10', indicating that the reported quantity is in tenths of volts: divide this value by ten to get the decimal value in volts.

## Minimum and Maximum ranges

These give the minimum and maximum allowable values to write to a register. The values are specified in their raw (unscaled) form. The MIN and MAX identifiers are used to show where the allowable value range is determined by the data type.

Attempting to set values outside of the specified ranges will result in the set value being clamped to the appropriate maximum or minimum.

## Example Queries

*Here we assume some familiarity with the Modbus protocol, as well as hex numbering and notation (0x00 etc). There are many good beginner tutorials available on the internet, and the Modbus protocol specification itself is an excellent reference.*

*Please note that as per Modbus protocol, the D232 and DUSB do not reply to queries with an invalid or missing CRC. An excellent online resource for calculating Modbus CRCs can be found at <http://www.lammertbies.nl/comm/info/crc-calculation.html> (but please note that the byte order of the output is wrong! - use the example below as a reference). Other PC programs are also available, such as RealTerm, which can automatically append correct CRC bytes to manually constructed queries.*

## Read Battery Voltage

In this example we send a modbus request to device address 8 to read a single (1) register whose PDU address is 0x1004. The request has a total length of 8 bytes and includes a valid CRC computed from the first 6 bytes. We receive a valid response with a valid CRC saying that the register value is 0x007C, or 124 in decimal. The units of this register are Volts/10, so to get a reading in volts, we multiply by 10 to get 12.4 volts.

Tx (Send):

0x08 0x04 0x10 0x04 0x00 0x01 0x74 0x52

Rx: (Receive):

0x08 0x04 0x02 0x00 0x7C 0x64 0xD0

## Changing the Float Voltage

Say we want to set the float voltage to 14.0 volts. The PDU address for this setting is 0x3024, and its units are Volts/10. The required register value to write is therefore 140, or 0x008C hex. Even though we only want to set one register, the D232 and DUSB only supports function code 0x10 (write multiple registers), so we use this request, specifying one register only (i.e. 2 bytes).

The response confirms that one register at address 0x3024 was successfully written. (The Dingo may take a few minutes to make the changes become active.)

Tx:

0x08 0x10 0x30 0x24 0x00 0x01 0x02 0x00 0x8c 0xFB 0x42

Rx:

0x08 0x10 0x30 0x24 0x00 0x01 0x4e 0x5b

PROPERTYID	Description	PDU address	(dec)	Mask	Data type	Units	Min	Max	Special
PROP_PROG	PROG setting value	0x1000	4096	0xF0	UINT8		0	4	
PROP_VOLT	VOLT setting value	0x1000	4096	0x0F	UINT8	enum	0	4	
PROP_MINS	Clock minute counter (remainder of hours below)	0x1001	4097		UINT16	Minutes	0	5	
PROP_HOURS	Clock hour counter	0x1002	4098		UINT16	Hours / 10	0	240	
PROP_BATTEMP	Battery temperature	0x1003	4099		INT8	degC	-128	127	
PROP_BATV	Battery voltage	0x1004	4100		UINT16	Volts/10	0	MAX	
	<i>Identical to above.</i>	0x1005	4101						
PROP_REGV	Regulation target voltage	0x1006	4102		UINT16	Volts /10	0	MAX	
PROP_INFOEQU	Days since equalization	0x1007	4103		UINT16	Days	0	255	
PROP_INFOBOOST	Days since last boost	0x1008	4104		UINT16	Days	0	255	
PROP_DFLTIM	Clock time we went into float	0x1009	4105		UINT16	Hours / 10	0	239	
PROP_DSOC	State of Charge	0x100A	4106		UINT16	Percent	0	100	
PROP_DVMAX	Day max battery voltage	0x100B	4107		UINT16	Volts /10	0	MAX	
PROP_DVMIN	Day min battery voltage	0x100C	4108		UINT16	Volts /10	0	MAX	
	Regulator State byte	0x100D	4109		UINT8	bitmask	0	0xFF	
PROP_LSTATE	Load state	0x100D	4109	0x80	BOOL		0	1	
PROP_GSTATE	Generator state	0x100D	4109	0x40	BOOL		0	1	
PROP_ESTATE	Event controller state	0x100D	4109	0x20	BOOL		0	1	
PROP_CPSTATE	Charge protection state	0x100D	4109	0x10	BOOL		0	1	
PROP_ASTATE	Alarm state	0x100D	4109	0x08	BOOL		0	1	
PROP_LPSTATE	Load protection state	0x100D	4109	0x04	BOOL		0	1	
PROP_MSTATE	Regulator Mode state	0x100D	4109	0x03	UINT		0	3	
PROP_VERS	Dingo Version number	0x100E	4110		UINT8		0	255	
PROP_APPTCOMP	Amount of temperature compensation applied	0x100F	4111		INT8	Volts /10	-128	127	
PROP_CINT	Internal charge current	0x1020	4128		UINT16	Amps / 10	0	MAX	
	<i>Identical to above.</i>	0x1021	4129						
PROP_CIAH	Internal charge Ah	0x1022	4130		UINT16	Ah	0	MAX	
	<i>Identical to above.</i>	0x1023	4131						
PROP_LINT	Internal load current	0x1024	4132		UINT16	Amps / 10	0	MAX	
	<i>Identical to above.</i>	0x1025	4133						
PROP_CEAH	Internal load Ah	0x1026	4134		UINT16	Ah	0	MAX	
	<i>Identical to above.</i>	0x1027	4135						
PROP_CEXT	External charge current	0x1028	4136		UINT16	Amps / 10	0	MAX	
	<i>Identical to above.</i>	0x1029	4137						
PROP_CIN	Total in Ah	0x102A	4138		UINT16	Ah	0	MAX	
	<i>Identical to above.</i>	0x102B	4139						
PROP_LEXT	External load current	0x102C	4140		UINT16	Amps / 10	0	MAX	
	<i>Identical to above.</i>	0x102D	4141						
PROP_COUT	Total out Ah	0x102E	4142		UINT16	Ah	0	MAX	
	<i>Identical to above.</i>	0x102F	4143						
PROP_SHCHARG1	Shunt 1 Ah	0x1040	4160		INT16	Ah	-32768	32767	
	<i>Identical to above.</i>	0x1041	4161						
PROP_SHCHARG2	Shunt 2 Ah	0x1042	4162		INT16	Ah	-32768	32767	
	<i>Identical to above.</i>	0x1043	4163						

PROPERTYID	Description	PDU address	(dec)	Mask	Data type	Units	Min	Max	Special
PROP_SHCHARG3	Shunt 3 Ah	0x1044	4164		INT16	Ah	-32768	32767	
	<i>Identical to above.</i>	0x1045	4165						
PROP_SHCHARG4	Shunt 4 Ah	0x1046	4166		INT16	Ah	-32768	32767	
	<i>Identical to above.</i>	0x1047	4167						
PROP_SHCURRE1	Shunt 1 Current	0x1048	4168		INT16	Amps / 10	-32768	32767	
	<i>Identical to above.</i>	0x1049	4169						
PROP_SHCURRE2	Shunt 2 Current	0x104A	4170		INT16	Amps / 10	-32768	32767	
	<i>Identical to above.</i>	0x104B	4171						
PROP_SHCURRE3	Shunt 3 Current	0x104C	4172		INT16	Amps / 10	-32768	32767	
	<i>Identical to above.</i>	0x104D	4173						
PROP_SHCURRE4	Shunt 4 Current	0x104E	4174		INT16	Amps / 10	-32768	32767	
	<i>Identical to above.</i>	0x104F	4175						
PROP_SWCONTROL1	Control byte 1	0x1200	4608		UINT8	BITMASK			
PROP_SWCONTROL2	Control byte 2	0x1201	4609		UINT8	BITMASK			
PROP_SWCHARG1	Block 1Ah	0x1202	4610		INT16	Ah	-32768	32767	
	<i>Identical to above.</i>	0x1203	4611						
PROP_SWCHARG2	Block 2 Ah	0x1204	4612		INT16	Ah	-32768	32767	
	<i>Identical to above.</i>	0x1205	4613						
PROP_SWCURRE1	Block 1 Current	0x1206	4614		INT16	Amps / 10	-32768	32767	
	<i>Identical to above.</i>	0x1207	4615						
PROP_SWDUTYCYC1	Block 1 duty cycle	0x1208	4616		UINT8	%	0	127	
PROP_SWTEMP1	Block 1 Temperature	0x1209	4617		INT8	degC	-127	128	
PROP_SWCURRE2	Block 2 Current	0x120A	4618		INT16	Amps / 10	-32768	32767	
	<i>Identical to above.</i>	0x120B	4619						
PROP_SWDUTYCYC2	Block 2 duty cycle	0x120C	4620		UINT8	%	0	127	
PROP_SWTEMP2	Block 2 Temperature	0x120D	4621		INT8	degC	-127	128	
PROP_SWCONTROL3	Control byte 3	0x1210	4624		UINT8	BITMASK			
PROP_SWCONTROL4	Control byte 4	0x1211	4625		UINT8	BITMASK			
PROP_SWCHARG3	Block 31Ah	0x1212	4626		INT16	Ah	-32768	32767	
	<i>Identical to above.</i>	0x1213	4627						
PROP_SWCHARG4	Block 4 Ah	0x1214	4628		INT16	Ah	-32768	32767	
	<i>Identical to above.</i>	0x1215	4629						
PROP_SWCURRE3	Block 3 Current	0x1216	4630		INT16	Amps / 10	-32768	32767	
	<i>Identical to above.</i>	0x1217	4631						
PROP_SWDUTYCYC3	Block 3 duty cycle	0x1218	4632		UINT8	%	0	127	
PROP_SWTEMP3	Block 3 Temperature	0x1219	4633		INT8	degC	-127	128	
PROP_SWCURRE4	Block 4 Current	0x121A	4634		INT16	Amps / 10	-32768	32767	
	<i>Identical to above.</i>	0x121B	4635						
PROP_SWDUTYCYC4	Block 4 duty cycle	0x121C	4636		UINT8	%	0	127	
PROP_SWTEMP4	Block 4 Temperature	0x121D	4637		INT8	degC	-127	128	
PROP_SWCONTROL5	Control byte 5	0x1220	4640		UINT8	BITMASK			
PROP_SWCONTROL6	Control byte 6	0x1221	4641		UINT8	BITMASK			
PROP_SWCHARG5	Block 5 Ah	0x1222	4642		INT16	Ah	-32768	32767	

PROPERTYID	Description	PDU address	(dec)	Mask	Data type	Units	Min	Max	Special
	<i>Identical to above.</i>	0x1223	4643						
PROP_SWCHARG6	Block 6 Ah	0x1224	4644		INT16	Ah	-32768	32767	
	<i>Identical to above.</i>	0x1225	4645						
PROP_SWCURR5	Block 5 Current	0x1226	4646		INT16	Amps / 10	-32768	32767	
	<i>Identical to above.</i>	0x1227	4647						
PROP_SWDUTYCYC5	Block 5 duty cycle	0x1228	4648		UINT8	%	0	127	
PROP_SWTEMP5	Block 5 Temperature	0x1229	4649		INT8	degC	-127	128	
PROP_SWCURR6	Block 6 Current	0x122A	4650		INT16	Amps / 10	-32768	32767	
	<i>Identical to above.</i>	0x122B	4651						
PROP_SWDUTYCYC6	Block 6 duty cycle	0x122C	4652		UINT8	%	0	127	
PROP_SWTEMP6	Block 6 Temperature	0x122D	4653		INT8	degC	-127	128	
PROP_SWCONTROL7	Control byte 7	0x1230	4656		UINT8	BITMASK			
PROP_SWCONTROL8	Control byte 8	0x1231	4657		UINT8	BITMASK			
PROP_SWCHARG7	Block 7Ah	0x1232	4658		INT16	Ah	-32768	32767	
	<i>Identical to above.</i>	0x1233	4659						
PROP_SWCHARG8	Block 8 Ah	0x1234	4660		INT16	Ah	-32768	32767	
	<i>Identical to above.</i>	0x1235	4661						
PROP_SWCURR7	Block 7 Current	0x1236	4662		INT16	Amps / 10	-32768	32767	
	<i>Identical to above.</i>	0x1237	4663						
PROP_SWDUTYCYC7	Block 7 duty cycle	0x1238	4664		UINT8	%	0	127	
PROP_SWTEMP7	Block 7 Temperature	0x1239	4665		INT8	degC	-127	128	
PROP_SWCURR8	Block 8 Current	0x123A	4666		INT16	Amps / 10	-32768	32767	
	<i>Identical to above.</i>	0x123B	4667						
PROP_SWDUTYCYC8	Block 8 duty cycle	0x123C	4668		UINT8	%	0	127	
PROP_SWTEMP8	Block 8 Temperature	0x123D	4669		INT8	degC	-127	128	
PROP_SWCONTROL9	Control byte 9	0x1240	4672		UINT8	BITMASK			
PROP_SWCONTROL10	Control byte 10	0x1241	4673		UINT8	BITMASK			
PROP_SWCHARG9	Block 9Ah	0x1242	4674		INT16	Ah	-32768	32767	
	<i>Identical to above.</i>	0x1243	4675						
PROP_SWCHARG10	Block 10 Ah	0x1244	4676		INT16	Ah	-32768	32767	
	<i>Identical to above.</i>	0x1245	4677						
PROP_SWCURR9	Block 9 Current	0x1246	4678		INT16	Amps / 10	-32768	32767	
	<i>Identical to above.</i>	0x1247	4679						
PROP_SWDUTYCYC9	Block 9 duty cycle	0x1248	4680		UINT8	%	0	127	
PROP_SWTEMP9	Block 9 Temperature	0x1249	4681		INT8	degC	-127	128	
PROP_SWCURR10	Block 10 Current	0x124A	4682		INT16	Amps / 10	-32768	32767	
	<i>Identical to above.</i>	0x124B	4683						
PROP_SWDUTYCYC10	Block 10 duty cycle	0x124C	4684		UINT8	%	0	127	
PROP_SWTEMP10	Block 10 Temperature	0x124D	4685		INT8	degC	-127	128	
PROP_SWCONTROL11	Control byte 11	0x1250	4688		UINT8	BITMASK			
PROP_SWCONTROL12	Control byte 12	0x1251	4689		UINT8	BITMASK			
PROP_SWCHARG11	Block 11Ah	0x1252	4690		INT16	Ah	-32768	32767	
	<i>Identical to above.</i>	0x1253	4691						

PROPERTYID	Description	PDU address	(dec)	Mask	Data type	Units	Min	Max	Special
PROP_SWCHARG12	Block 12 Ah	0x1254	4692		INT16	Ah	-32768	32767	
	<i>Identical to above.</i>	0x1255	4693						
PROP_SWCURR11	Block 11 Current	0x1256	4694		INT16	Amps / 10	-32768	32767	
	<i>Identical to above.</i>	0x1257	4695						
PROP_SWDUTYCYC11	Block 11 duty cycle	0x1258	4696		UINT8	%	0	127	
PROP_SWTEMP11	Block 11 Temperature	0x1259	4697		INT8	degC	-127	128	
PROP_SWCURR12	Block 12 Current	0x125A	4698		INT16	Amps / 10	-32768	32767	
	<i>Identical to above.</i>	0x125B	4699						
PROP_SWDUTYCYC12	Block 12 duty cycle	0x125C	4700		UINT8	%	0	127	
PROP_SWTEMP12	Block 12 Temperature	0x125D	4701		INT8	degC	-127	128	
PROP_BPUSHSHORT	Sends a short button push command when value 0x67 written to this address	0x1F21	7969		UINT16		MIN	MAX	W
PROP_BPUSHLONG	Sends a long button push commnd when value 0x67 written to this address	0x1F23	7971		UINT16		MIN	MAX	
PROP_PLM_LCDDA	Left digit	0x1F30	7984	0x0F					
PROP_PLM_LCDDA	Middle digit	0x1F30	7984	0xF0					
PROP_PLM_LCDDB	Flags (see note)	0x1F31	7985	0xFF					
PROP_PLM_LCDDB	Right character	0x1F31	7985	0x0F					
PROP_DSTATE	Screen number. (See DSTATE property)	0x1F32	7986	0xFF					
PROP_CONOUT		0x1F33	7987	0xFF					
PROP_PLM_STATEBITS	Misc flags (See notes)	0x1F34	7988	0xFF					
PROP_PLM_POS1	Extra info for external devices.	0x1F35	7989	0xFF					
PROP_NIGHT	Night counter. Counts towards negative in low light conditions	0x2025	8229		INT8		-128	127	
PROP_INFOPWM	PWM duty cycle info. Value range maps to 100%	0x2027	8231				0	255	
PROP_MINS	Minutes counter.	0x202F	8239		UINT8		0	6	
PROP_HOURS	Hours counter	0x2030	8240		UINT8	Hours / 10	0	240	
PROP_BATTEMP	Battery temperature	0x2031	8241		INT8	DegC			
PROP_BATV	Battery voltage	0x2032	8242		uint16	Volts / 10			
PROP_REGV	Regulator target voltage	0x2034	8244		uint16				
PROP_INFOEQU	Days since equalization	0x2035	8245						
PROP_INFOBOOST	Days since boost	0x2036	8246						
PROP_INFOESTART	Flag for whether the start condition is in effect	0x203A	8250	0x01	BOOL				
PROP_INFOTMOD	Flag for whether the TMOD condition is in effect	0x203A	8250	0x02	BOOL				
PROP_INFOEMOD	Flag for whether the EMOD condition is in effect	0x203A	8250	0x04	BOOL				
PROP_INFOESTOP	Flag for whether the STOP condition is in effect	0x203A	8250	0x08	BOOL				
PROP_INFOERUN	Event run timer	0x203B	8251		UINT8	Minutes			
PROP_INFOEREPEAT	Event repeat timer	0x203C	8252		UINT8	Minutes			
PROP_INFOGEN	Generator on time	0x203D	8253		UINT8	Hours / 10			
PROP_INFOGDEL	Generator hold off delay	0x203E	8254		UINT8	Minutes			
PROP_GON	Generator turn on voltage	0x2040	8256		UINT8	Volts /10	100	125	
PROP_GOFF	Generator turn off voltage	0x2041	8257		UINT8	Volts /10	110	165	
PROP_GDEL	Generator delay time (0 means off)	0x2042	8258		UINT8	minutes	0	15	
PROP_GEXD	Generator exercise frequency	0x2043	8259		UINT8	days	2	60	

PROPERTYID	Description	PDU address	(dec)	Mask	Data type	Units	Min	Max	Special
PROP_GRUN	Generator run time	0x2044	8260		UINT8	hours	0	40	
PROP_LOFF	Load disconnect voltage	0x2045	8261		UINT8	Volts /10	100	125	
PROP_LON	Load reconnect voltage	0x2046	8262		UINT8	Volts /10	110	160	
PROP_LDEL	Load transition delay	0x2047	8263		UINT8	minutes	0	15	
PROP_ASET	Alarm setting value (voltage which alarm turns on)	0x2048	8264		UINT8	Volts /10	100	255?	
PROP_BSTFREQ	Boost frequency (force boost after this many days)	0x2049	8265		UINT8	days	1	10?	
PROP_ATIM	Absorption time	0x204A	8266		UINT8	hours /10	0	40	
PROP_HYST	Hysteresis	0x204B	8267		UINT8	Volts	1	10	
PROP_BRET	Return to boost voltage (BRTN)	0x204C	8268		UINT8	Volts	110	130	
PROP_CURLIM	Current limit	0x204D	8269		UINT8	Amps / 2	1	40	
PROP_BAT2	Regulation voltage for the second battery	0x204E	8270		UINT8	Volts	130	160	
PROP_ESET1	Event control settings 1	0x204F	8271		UINT8	Ref manual			
PROP_ESET2	Event control settings 2	0x2050	8272		UINT8	Ref manual			
PROP_ESET3	Event control settings 3	0x2051	8273		UINT8	Ref manual			
PROP_EQFREQ	Period between equalisation cycles	0x2052	8274		UINT8	days	20	150	
PROP_ETIM	Length of time of equalisation cycle	0x2053	8275		UINT8	hours	0	2	
PROP_ABSV	Absorption voltage	0x2054	8276		UINT8	Volts / 10	135	155	
PROP_EMAX	Equalisation maximum voltage	0x2055	8277		UINT8	Volts / 10	140	170	
PROP_FLTV	Float voltage	0x2056	8278		UINT8	Volts / 10	130	150	
PROP_BMAX	Boost maximum voltage	0x2057	8279		UINT8	Volts / 10	135	165	
PROP_GSET	Determines use of G Terminal	0x2058	8280	0xF0	ENUM	Ref manual	0	11	
PROP_LSET	Determines use of L Terminal	0x2058	8280	0x0F	ENUM	Ref manual	0	11	
PROP_BSET	Battery sense usage	0x2059	8281	0xF0	ENUM	Ref manual	0	2	
PROP_PWM	Regulation method	0x2059	8281	0x0F	ENUM	Ref manual	0	3	
PROP_STOP	Event Stop modes	0x205A	8282	0xF0	ENUM	Ref manual	0	15	
PROP_START	Event Start modes	0x205A	8282	0x0F	ENUM	Ref manual	0	15	
PROP_TMOD	Selections for event controller	0x205B	8283	0xF0	ENUM	Ref manual			
PROP_EMOD	Selections for event controller	0x205B	8283	0x0F	ENUM	Ref manual			
PROP_TCMP	Temperature compensation type	0x205C	8284	0xF0	ENUM	Ref manual	0	4	
PROP_GMOD	Generator mode	0x205C	8284	0x0F	ENUM	Ref manual	0	4	
PROP_PROG	Program number	0x205D	8285	0xF0	ENUM	Ref manual	0	4	
PROP_VOLT	Voltage Selection	0x205D	8285	0x0F		Ref manual	0	4	
PROP_BCAP	Battery Capacity	0x205E	8286		UINT8	Ah**	20	21580	
PROP_GON	Generator turn on voltage	0x300E	12302		UINT16	Volts /10	100	125	
PROP_GOFF	Generator turn off voltage	0x300F	12303		UINT16	Volts /10	110	165	
PROP_GDEL	Generator delay time (0 means off)	0x3010	12304		UINT8	minutes	0	15	
PROP_GEXD	Generator exercise frequency	0x3011	12305		UINT8	days	2	60	
PROP_GRUN	Generator run time	0x3012	12306		UINT8	hours	0	40	
PROP_LOFF	Load disconnect voltage	0x3013	12307		UINT16	Volts /10	100	125	
PROP_LON	Load reconnect voltage	0x3014	12308		UINT16	Volts /10	110	160	
PROP_LDEL	Load transition delay	0x3015	12309		UINT16	minutes	0	15	
PROP_ASET	Alarm setting value (voltage which alarm turns on)	0x3016	12310		UINT16	Volts /10	100	255?	
PROP_BSTFREQ	Boost frequency (force boost after this many days)	0x3017	12311		UINT16	days	1	10?	
PROP_ATIM	Absorption time	0x3018	12312		UINT16	hours /10	0	40	
PROP_HYST	Hysteresis	0x3019	12313		UINT16	Volts	1	10	
PROP_BRET	Return to boost voltage (BRTN)	0x301A	12314		UINT16	Volts	110	130	
PROP_CURLIM	Current limit	0x301B	12315		UINT16	Amps / 2	1	40	

PROPERTYID	Description	PDU address	(dec)	Mask	Data type	Units	Min	Max	Special
PROP_BAT2	Regulation voltage for the second battery	0x301C	12316		UINT16	Volts	130	160	
PROP_ESET1	Event control settings 1	0x301D	12317		UINT16	Ref manual	0	0	
PROP_ESET2	Event control settings 2	0x301E	12318		UINT16	Ref manual	0	0	
PROP_ESET3	Event control settings 3	0x301F	12319		UINT16	Ref manual	0	0	
PROP_EQFREQ	Period between equalisation cycles	0x3020	12320		UINT16	days	20	150	
PROP_ETIM	Length of time of equalisation cycle	0x3021	12321		UINT16	hours	0	2	
PROP_ABSV	Absorption voltage	0x3022	12322		UINT16	Volts / 10	135	155	
PROP_EMAX	Equalisation maximum voltage	0x3023	12323		UINT16	Volts / 10	140	170	
PROP_FLTV	Float voltage	0x3024	12324		UINT16	Volts / 10	130	150	
PROP_BMAX	Boost maximum voltage	0x3025	12325		UINT16	Volts / 10	135	165	
PROP_GSET	Determines use of G Terminal	0x3026	12326	0xF0	UINT8	Ref manual	0	11	
PROP_LSET	Determines use of L Terminal	0x3026	12326	0x0F		Ref manual	0	11	
PROP_BSET	Battery sense usage	0x3027	12327	0xF0	UINT8	Ref manual	0	2	
PROP_PWM	Regulation method	0x3027	12327	0x0F		Ref manual	0	3	
PROP_STOP	Event Stop modes	0x3028	12328	0xF0	UINT8	Ref manual	0	15	
PROP_STRT	Event Start modes	0x3028	12328	0x0F		Ref manual	0	15	
PROP_TMOD	Selections for event controller	0x3029	12329	0xF0	UINT8	Ref manual	0	0	
PROP_EMOD	Selections for event controller	0x3029	12329	0x0F		Ref manual	0	0	
PROP_TCMP	Temperature compensation type	0x302A	12330	0xF0	UINT8	Ref manual	0	4	
PROP_GMOD	Generator mode	0x302A	12330	0x0F		Ref manual	0	4	
PROP_PROG	Program number	0x302B	12331	0xF0	UINT8	Ref manual	0	4	
PROP_VOLT	Voltage Selection	0x302B	12331	0x0F		Ref manual	0	4	
PROP_BCAP	Battery Capacity	0x302C	12332	0xFF	UINT8	Ah**	20	21580	
PROP_GONSOC	Generator turn on SOC	0x302D	12333		UINT8	%	0	127	
PROP_GOFFSOC	Generator turn off SOC	0x302E	12334		UINT8	%	0	127	
PROP_HISTPTR	History day pointer	0x303E	12350						
PROP_HISTVMAX1	History Max voltage (Day 1: Yesterday)	0x4000	16384		UINT16	Volts / 10	0	1016	12VEQU
PROP_HISTVMIN1	History Min voltage	0x4001	16385		UINT16	Volts / 10	0	1016	12VEQU
PROP_HISTFLOAT1	History float time	0x4002	16386		UINT8	Hours / 10	0	239	
PROP_HISTSOC1	History State of Charge	0x4003	16387		UINT8	Percent	0	127	
PROP_HISTCHARGE1	History Charge (Ah out)	0x4004	16388		UINT16	Ah	0	65534	
	<i>Identical to above</i>	0x4005	16389						
PROP_HISTLOAD1	History load (Ah in)	0x4006	16390		UINT16	Ah	0	65534	
	<i>Identical to above</i>	0x4007	16391						
PROP_HISTVMAX2	History Max voltage (Day 2)	0x4008	16392		UINT16	Volts / 10	0	1016	12VEQU
PROP_HISTVMIN2	History Min voltage	0x4009	16393		UINT16	Volts / 10	0	1016	12VEQU
PROP_HISTFLOAT2	History float time	0x400A	16394		UINT8	Hours / 10	0	239	
PROP_HISTSOC2	History State of Charge	0x400B	16395		UINT8	Percent	0	127	
PROP_HISTCHARGE2	History Charge (Ah out)	0x400C	16396		UINT16	Ah	0	65534	
	<i>Identical to above</i>	0x400D	16397						
PROP_HISTLOAD2	History load (Ah in)	0x400E	16398		UINT16	Ah	0	65534	
	<i>Identical to above</i>	0x400F	16399						
PROP_HISTVMAX + n	History Max voltage (Day n)	0x4000 + ((n-1)*8)			UINT16	Volts / 10	0	1016	12VEQU
PROP_HISTVMIN + n	History Min voltage	0x4000 + ((n-1)*8) + 1			UINT16	Volts / 10	0	1016	12VEQU
PROP_HISTFLOAT + n	History float time	0x4000 + ((n-1)*8) + 2			UINT8	Hours / 10	0	239	
PROP_HISTSOC + n	History State of Charge	0x4000 + ((n-1)*8) + 3			UINT8	Percent	0	127	
PROP_HISTCHARGE + n	History Charge (Ah out)	0x4000 + ((n-1)*8) + 4			UINT16	Ah	0	65534	

