Mikro® Power Meter

DPM680

Modbus Communication Manual

TABLE OF CONTENT

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1 INTRODUCTION

The DPM680 Digital Power Meter is equipped with multiple communication capabilities for SCADA and remote monitoring purposes. In particular, its Modbus communication capabilities can be realised either through the Modbus RTU or Modbus TCP/IP system. As a supplement to the DPM680 Instruction Manual for aiding the configuration and commissioning of these systems, this manual contains the details of the available Modbus registers.

Note the details contained herein are based on the DPM680 power meter firmware version 2.0. Where conflict arises, the DPM680 Instruction Manual shall take precedence.

2 DATA TYPE

By default, the data format in each register is unsigned 16-bit word. Shorter data may be encoded in the unsigned 8-bit byte format whereas longer data may be encoded either in the unsigned 32-bit double word format, signed 32-bit integer format or signed 64-bit long integer format. Two's complement is used to represent signed numbers. The nomenclature used in this manual is shown in Table 1.

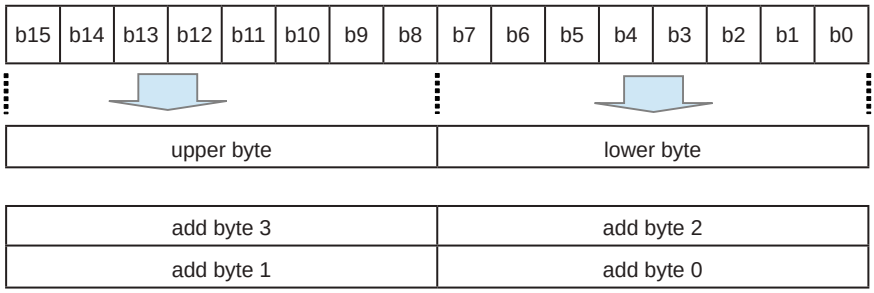
Table 1: Data length nomenclature

Date length	Unsigned	Signed
4-bit	nibble	-
8-bit	byte	-
16-bit	word	short
32-bit	dword	int
64-bit	qword	long

For data with length shorter than 16 bits, the upper unused bits, nibbles or bytes can be ignored. In cases where multiple registers are required, the big endian convention shall apply unless otherwise specified.

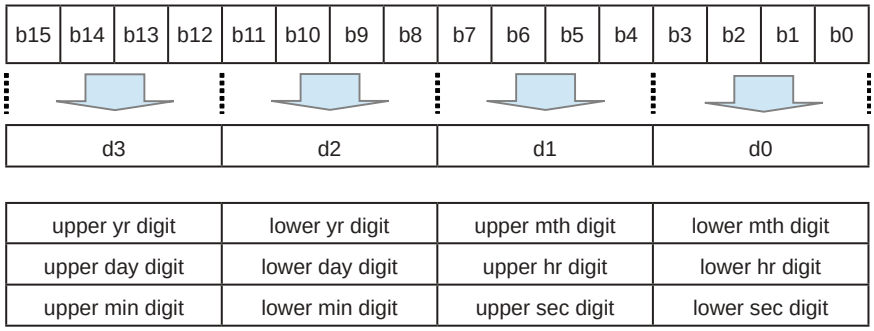
For composite words used in IP address and subnet mask registers, each word is partitioned into upper and lower bytes where 4 consecutive bytes collectively form the address as shown in Fig 1 where b denotes bit.

Fig 1: IP and subnet partitioning



In Binary Coded Decimal or BCD data, the data is partitioned into nibbles (4-bit blocks) and each nibble represents a digit (from 0 to 9) where the resulting sequence of digits represent a whole decimal number. This format is used in the date and time registers. In composite words used in time stamp registers, the data format is shown in Fig 2 where b and d denote bit and digit.

Fig 2: Time stamp partitioning



3
LIST OF REGISTERS

Tables 2, 3, 4 and 5 show the read only variables (function code 0x03 or 0x04) for device & communication info, operations, power factor and harmonics data respectively whereas Table 6 shows the read and write variables (function codes 0x03, 0x04 or 0x06) for the settings data.

Table 2: Device and communication info registers

	Read Only (function code 0x03 or $04)				
	Register	**Description**	**Type**	**Min unit**	**Range**
Device Info	0000	Device type – main	word	0x0000 ; 0x0003 ; 0x0002	-
	0001				
	0002				
	0003	Device type – sub	word	0x0000	-
	0004	Version number- main	word	0x0000 ; 0x0002	-
	0005				
	0006	Version number- sub	word	0x0000 ; 0x0000	-
	0007				
Communication Info	1000	Device ID address	byte	0x01	-
	1001	Parity selection	byte	0=none, 1 stop bit 1=none, 2 stop bit 2=odd, 1 stop bit 3=even, 1 stop bit	0 to 3
	1002	Baudrate selection	byte	1=300 2=600 3=1200 4=2400 5=4800 6=9600 7=19200 8=38400	0 to 8
	1003	IP Address	word	0x00 | 0x00 ; 0x00 | 0x00	0 to 0xFF | 0 to 0xFF ; 0 to 0xFF | 0 to 0xFF
	1004				
	1005	Subnet mask	word	0x00 | 0x00 ; 0x00 | 0x00	0 to 0xFF | 0 to 0xFF ; 0 to 0xFF | 0 to 0xFF
	1006				

Table 3: Operations data registers

	Read Only (function code 0x03 or 0x04)				
	Register	**Description**	**Type**	**Min unit**	**Range**
Operations Data	4000	Real energy	long	1Wh	-0x7FFFFFFFFFFFFFFF to +0x7FFFFFFFFFFFFFFF
	4001				
	4002				
	4003				
	4004	Apparent energy	long	1VAh	-0x7FFFFFFFFFFFFFFF to +0x7FFFFFFFFFFFFFFF
	4005				
	4006				
	4007				
	4008	Reactive energy	long	1VArh	-0x7FFFFFFFFFFFFFFF to +0x7FFFFFFFFFFFFFFF
	4009				
	4010				
	4011				
	4012	Total real power	int	1W	-0x7FFFFFFF to +0x7FFFFFFF
	4013				
	4014	Total apparent power	int	1VA	-0x7FFFFFFF to +0x7FFFFFFF
	4015				
	4016	Total reactive power	int	1VAr	-0x7FFFFFFF to +0x7FFFFFFF
	4017				
	4018	Total power factor**	word	0.001	0 to 1000
	4019	Frequency	word	0.01Hz	4500 to 6500

Table 3: Operations data registers (cont'd)

	Read Only (function code 0x03 or 0x04)				
	Register	**Description**	**Type**	**Min unit**	**Range**
Operations Data	4020	Instantaneous current A	dword	0.001A	0 to 0xFFFFFFFF
	4021				
	4022	Instantaneous current B	dword	0.001A	0 to 0xFFFFFFFF
	4023				
	4024	Instantaneous current C	dword	0.001A	0 to 0xFFFFFFFF
	4025				
	4026	instantaneous current N	dword	0.001A	0 to 0xFFFFFFFF
	4027				
	4028	Voltage line AB	dword	0.1V	0 to 0xFFFFFFFF
	4029				
	4030	Voltage line BC	dword	0.1V	0 to 0xFFFFFFFF
	4031				
	4032	Voltage line AC	dword	0.1V	0 to 0xFFFFFFFF
	4033				
	4034	Voltage phase AN	dword	0.1V	0 to 0xFFFFFFFF
	4035				
	4036	Voltage phase BN	dword	0.1V	0 to 0xFFFFFFFF
	4037				
	4038	Voltage phase CN	dword	0.1V	0 to 0xFFFFFFFF
	4039				
	4040	Real power A	int	1W	-0x7FFFFFFF to +0x7FFFFFFF
	4041				
	4042	Real power B	int	1W	-0x7FFFFFFF to +0x7FFFFFFF
	4043				
	4044	Real power C	int	1W	-0x7FFFFFFF to +0x7FFFFFFF
	4045				
	4046	Apparent power A	int	1VA	-0x7FFFFFFF to +0x7FFFFFFF
	4047				
	4048	Apparent power B	int	1VA	-0x7FFFFFFF to +0x7FFFFFFF
	4049				
	4050	Apparent power C	int	1VA	-0x7FFFFFFF to +0x7FFFFFFF
	4051				
	4052	Reactive power A	int	1VAr	-0x7FFFFFFF to +0x7FFFFFFF
	4053				
	4054	Reactive power B	int	1VAr	-0x7FFFFFFF to +0x7FFFFFFF
	4055				
	4056	Reactive power C	int	1VAr	-0x7FFFFFFF to +0x7FFFFFFF
	4057				
	4058	Current demand A	dword	0.001Arms	0 to 0xFFFFFFFF
	4059				
	4060	Current demand B	dword	0.001Arms	0 to 0xFFFFFFFF
	4061				
	4062	Current demand C	dword	0.001Arms	0 to 0xFFFFFFFF
	4063				
	4064	Real power demand	int	1W	-0x7FFFFFFF to +0x7FFFFFFF
	4065				

Table 3: Operations data registers (cont'd)

	Read Only (function code 0x03 or 0x04)				
	Register	**Description**	**Type**	**Min unit**	**Range**
Operations Data	4066	Reactive power demand	int	1VAr	-0x7FFFFFFF to +0x7FFFFFFF
	4067				
	4068	Apparent power demand	int	1VA	-0x7FFFFFFF to +0x7FFFFFFF
	4069				
	4070	Positive sequence current	dword	0.001A	0 to 0xFFFFFFFF
	4071				
	4072	Negative sequence current	dword	0.001A	0 to 0xFFFFFFFF
	4073				
	4074	Zero sequence current	dword	0.001A	0 to 0xFFFFFFFF
	4075				
	4076	Positive sequence phase voltage	dword	0.1V	0 to 0xFFFFFFFF
	4077				
	4078	Negative sequence phase voltage	dword	0.1V	0 to 0xFFFFFFFF
	4079				
	4080	Zero sequence phase voltage	dword	0.1V	0 to 0xFFFFFFFF
	4081				
	4082	Current THD A**	word	0.1%	0 to 1000
	4083	Current THD B**	word	0.1%	0 to 1000
	4084	Current THD C**	word	0.1%	0 to 1000
	4085	Voltage THD A**	word	0.1%	0 to 1000
	4086	Voltage THD B**	word	0.1%	0 to 1000
	4087	Voltage THD C**	word	0.1%	0 to 1000
	4088	Peak current A	dword	0.001A	0 to 0xFFFFFFFF
	4089				
	4090	Year & month of peak current A	BCD	1yr ; 1mth	0 to 5 : 0 to 9 ; 0 to 1 : 0 to 9
	4091	Day & hour of peak current A	BCD	1day ; 1hr	0 to 3 : 0 to 9 ; 0 to 2 : 0 to 9
	4092	Minute & second of peak current A	BCD	1min ; 1sec	0 to 5 : 0 to 9 ; 0 to 5 : 0 to 9
	4093	Peak current B	dword	0.001A	0 to 0xFFFFFFFF
	4094				
	4095	Year & month of peak current B	BCD	1yr ; 1mth	0 to 5 : 0 to 9 ; 0 to 1 : 0 to 9
	4096	Day & hour of peak current B	BCD	1day ; 1hr	0 to 3 : 0 to 9 ; 0 to 2 : 0 to 9
	4097	Minute & second of peak current B	BCD	1min ; 1sec	0 to 5 : 0 to 9 ; 0 to 5 : 0 to 9
	4098	Peak current C	dword	0.001A	0 to 0xFFFFFFFF
	4099				
	4100	Year & month of peak current C	BCD	1yr ; 1mth	0 to 5 : 0 to 9 ; 0 to 1 : 0 to 9
	4101	Day & hour of peak current C	BCD	1day ; 1hr	0 to 3 : 0 to 9 ; 0 to 2 : 0 to 9
	4102	Minute & second of peak current C	BCD	1min ; 1sec	0 to 5 : 0 to 9 ; 0 to 5 : 0 to 9
	4103	Peak current N	dword	0.001A	0 to 0xFFFFFFFF
	4104				

Table 3: Operations data registers (cont'd)

	Read Only (function code 0x03 or 0x04)				
	Register	**Description**	**Type**	**Min unit**	**Range**
Operations Data	4105	Year & month of peak current N	BCD	1yr ; 1mth	0 to 5 : 0 to 9 ; 0 to 1 : 0 to 9
	4106	Day & hour of peak current N	BCD	1day ; 1hr	0 to 3 : 0 to 9 ; 0 to 2 : 0 to 9
	4107	Minute & second of peak current N	BCD	1min ; 1sec	0 to 5 : 0 to 9 ; 0 to 5 : 0 to 9
	4108	Peak voltage phase AN	dword	0.1V	0 to 0xFFFFFFFF
	4109				
	4110	Year & month of peak voltage AN	BCD	1yr ; 1mth	0 to 5 : 0 to 9 ; 0 to 1 : 0 to 9
	4111	Day & hour of peak voltage AN	BCD	1day ; 1hr	0 to 3 : 0 to 9 ; 0 to 2 : 0 to 9
	4112	Minute & second of peak voltage AN	BCD	1min ; 1sec	0 to 5 : 0 to 9 ; 0 to 5 : 0 to 9
	4113	Peak voltage phase BN	dword	0.1V	0 to 0xFFFFFFFF
	4114				
	4115	Year & month of peak voltage BN	BCD	1yr ; 1mth	0 to 5 : 0 to 9 ; 0 to 1 : 0 to 9
	4116	Day & hour of peak voltage BN	BCD	1day ; 1hr	0 to 3 : 0 to 9 ; 0 to 2 : 0 to 9
	4117	Minute & second of peak voltage BN	BCD	1min ; 1sec	0 to 5 : 0 to 9 ; 0 to 5 : 0 to 9
	4118	Peak voltage phase CN	dword	0.1V	0 to 0xFFFFFFFF
	4119				
	4120	Year & month of peak voltage CN	BCD	1yr ; 1mth	0 to 5 : 0 to 9 ; 0 to 1 : 0 to 9
	4121	Day & hour of peak voltage CN	BCD	1day ; 1hr	0 to 3 : 0 to 9 ; 0 to 2 : 0 to 9
	4122	Minute & second of peak voltage CN	BCD	1min ; 1sec	0 to 5 : 0 to 9 ; 0 to 5 : 0 to 9
	4123	Maximum current demand A	dword	0.001Arms	0 to 0xFFFFFFFF
	4124				
	4125	Year & month of maximum current demand A	BCD	1yr ; 1mth	0 to 5 : 0 to 9 ; 0 to 1 : 0 to 9
	4126	Day & hour of maximum current demand A	BCD	1day ; 1hr	0 to 3 : 0 to 9 ; 0 to 2 : 0 to 9
	4127	Minute & second of maximum current demand A	BCD	1min ; 1sec	0 to 5 : 0 to 9 ; 0 to 5 : 0 to 9
	4128	Maximum current demand B	dword	0.001Arms	0 to 0xFFFFFFFF
	4129				
	4130	Year & month of maximum current demand B	BCD	1yr ; 1mth	0 to 5 : 0 to 9 ; 0 to 1 : 0 to 9
	4131	Day & hour of maximum current demand B	BCD	1day ; 1hr	0 to 3 : 0 to 9 ; 0 to 2 : 0 to 9
	4132	Minute & second of maximum current demand B	BCD	1min ; 1sec	0 to 5 : 0 to 9 ; 0 to 5 : 0 to 9
	4133	Maximum current demand C	dword	0.001Arms	0 to 0xFFFFFFFF
	4134				
	4135	Year & month of maximum current demand C	BCD	1yr ; 1mth	0 to 5 : 0 to 9 ; 0 to 1 : 0 to 9
	4136	Day & hour of maximum current demand C	BCD	1day ; 1hr	0 to 3 : 0 to 9 ; 0 to 2 : 0 to 9

Table 3: Operations data registers (cont'd)

	Read Only (function code 0x03 or 0x04)				
	Register	**Description**	**Type**	**Min unit**	**Range**
Operations Data	4137	Minute & second of maximum current demand C	BCD	1min ; 1sec	0 to 5 : 0 to 9 ; 0 to 5 : 0 to 9
	4138	Maximum real power demand	dword	1W	0 to +0x7FFFFFFF
	4139				
	4140	Year & month of maximum real power demand	BCD	1yr ; 1mth	0 to 5 : 0 to 9 ; 0 to 1 : 0 to 9
	4141	Day & hour of maximum real power demand	BCD	1day ; 1hr	0 to 3 : 0 to 9 ; 0 to 2 : 0 to 9
	4142	Minute & second of maximum real power demand	BCD	1min ; 1sec	0 to 5 : 0 to 9 ; 0 to 5 : 0 to 9
	4143	Maximum reactive power demand	dword	1VAr	0 to +0x7FFFFFFF
	4144				
	4145	Year & month of maximum reactive power demand	BCD	1yr ; 1mth	0 to 5 : 0 to 9 ; 0 to 1 : 0 to 9
	4146	Day & hour of maximum reactive power demand	BCD	1day ; 1hr	0 to 3 : 0 to 9 ; 0 to 2 : 0 to 9
	4147	Minute & second of maximum reactive power demand	BCD	1min ; 1sec	0 to 5 : 0 to 9 ; 0 to 5 : 0 to 9
	4148	Maximum apparent power demand	dword	1VA	0 to +0x7FFFFFFF
	4149				
	4150	Year & month of maximum apparent power demand	BCD	1yr ; 1mth	0 to 5 : 0 to 9 ; 0 to 1 : 0 to 9
	4151	Day & hour of maximum apparent power demand	BCD	1day ; 1hr	0 to 3 : 0 to 9 ; 0 to 2 : 0 to 9
	4152	Minute & second of maximum apparent power demand	BCD	1min ; 1sec	0 to 5 : 0 to 9 ; 0 to 5 : 0 to 9

Table 4: Power factor data registers

	Read Only (function code 0x03 or 0x04)				
	Register	**Description**	**Type**	**Min unit**	**Range**
Power Factor Data	4153	Power factor A**	word	0.001	0 to 1000
	4154	Power factor sector A**	byte	0=resistive 1=inductive 2=capacitive	0 to 2
	4155	Power factor B**	word	0.001	0 to 1000
	4156	Power factor sector B**	byte	0=resistive 1=inductive 2=capacitive	0 to 2
	4157	Power factor C**	word	0.001	0 to 1000
	4158	Power factor sector C**	byte	0=resistive 1=inductive 2=capacitive	0 to 2
	4159	Total power factor**	word	0.001	0 to 1000
	4160	Total power factor sector**	byte	0=resistive 1=inductive 2=capacitive	0 to 2
	4161	Displacement power factor A**	word	0.001	0 to 1000
	4162	Displacement power factor sector A**	byte	0=resistive 1=inductive 2=capacitive	0 to 2
	4163	Displacement power factor B**	word	0.001	0 to 1000
	4164	Displacement power factor sector B**	byte	0=resistive 1=inductive 2=capacitive	0 to 2

Table 4: Power factor data registers (cont'd)

	Read Only (function code 0x03 or 0x04)				
	Register	**Description**	**Type**	**Min unit**	**Range**
	4165	Displacement power factor C**	word	0.001	0 to 1000
	4166	Displacement power factor sector C**	byte	0=resistive 1=inductive 2=capacitive	0 to 2

*** for indeterminate power factor and total harmonic distortion data, 0xFFFF will be returned*

Table 5: Harmonics data registers

	Read Only (function code 0x03 or 0x04)				
	Register	**Description**	**Type**	**Min unit**	**Range**
Harmonics Data	4200	Current fundamental harmonic A	byte	1%	0 to 100
	4201	Current 2nd harmonic A	byte	1%	0 to 100
	4202	Current 3rd harmonic A	byte	1%	0 to 100
	4203	Current 4th harmonic A	byte	1%	0 to 100
	4204	Current 5th harmonic A	byte	1%	0 to 100
	4205	Current 6th harmonic A	byte	1%	0 to 100
	4206	Current 7th harmonic A	byte	1%	0 to 100
	4207	Current 8th harmonic A	byte	1%	0 to 100
	4208	Current 9th harmonic A	byte	1%	0 to 100
	4209	Current 10th harmonic A	byte	1%	0 to 100
	4210	Current 11th harmonic A	byte	1%	0 to 100
	4211	Current 12th harmonic A	byte	1%	0 to 100
	4212	Current 13th harmonic A	byte	1%	0 to 100
	4213	Current 14th harmonic A	byte	1%	0 to 100
	4214	Current 15th harmonic A	byte	1%	0 to 100
	4215	Current 16th harmonic A	byte	1%	0 to 100
	4216	Current 17th harmonic A	byte	1%	0 to 100
	4217	Current 18th harmonic A	byte	1%	0 to 100
	4218	Current 19th harmonic A	byte	1%	0 to 100
	4219	Current 20th harmonic A	byte	1%	0 to 100
	4220	Current 21st harmonic A	byte	1%	0 to 100
	4221	Current 22nd harmonic A	byte	1%	0 to 100
	4222	Current 23rd harmonic A	byte	1%	0 to 100
	4223	Current 24th harmonic A	byte	1%	0 to 100
	4224	Current 25th harmonic A	byte	1%	0 to 100
	4225	Current 26th harmonic A	byte	1%	0 to 100
	4226	Current 27th harmonic A	byte	1%	0 to 100
	4227	Current 28th harmonic A	byte	1%	0 to 100
	4228	Current 29th harmonic A	byte	1%	0 to 100
	4229	Current 30th harmonic A	byte	1%	0 to 100
	4230	Current 31st harmonic A	byte	1%	0 to 100
	4231	Current 32nd harmonic A	byte	1%	0 to 100
	4232	Current fundamental harmonic B	byte	1%	0 to 100
	4233	Current 2nd harmonic B	byte	1%	0 to 100
	4234	Current 3rd harmonic B	byte	1%	0 to 100
	4235	Current 4th harmonic B	byte	1%	0 to 100

Table 5: Harmonics data registers (cont'd)

	Read Only (function code 0x03 or 0x04)				
	Register	**Description**	**Type**	**Min unit**	**Range**
Harmonics Data	4236	Current 5th harmonic B	byte	1%	0 to 100
	4237	Current 6th harmonic B	byte	1%	0 to 100
	4238	Current 7th harmonic B	byte	1%	0 to 100
	4239	Current 8th harmonic B	byte	1%	0 to 100
	4240	Current 9th harmonic B	byte	1%	0 to 100
	4241	Current 10th harmonic B	byte	1%	0 to 100
	4242	Current 11th harmonic B	byte	1%	0 to 100
	4243	Current 12th harmonic B	byte	1%	0 to 100
	4244	Current 13th harmonic B	byte	1%	0 to 100
	4245	Current 14th harmonic B	byte	1%	0 to 100
	4246	Current 15th harmonic B	byte	1%	0 to 100
	4247	Current 16th harmonic B	byte	1%	0 to 100
	4248	Current 17th harmonic B	byte	1%	0 to 100
	4249	Current 18th harmonic B	byte	1%	0 to 100
	4250	Current 19th harmonic B	byte	1%	0 to 100
	4251	Current 20th harmonic B	byte	1%	0 to 100
	4252	Current 21st harmonic B	byte	1%	0 to 100
	4253	Current 22nd harmonic B	byte	1%	0 to 100
	4254	Current 23rd harmonic B	byte	1%	0 to 100
	4255	Current 24th harmonic B	byte	1%	0 to 100
	4256	Current 25th harmonic B	byte	1%	0 to 100
	4257	Current 26th harmonic B	byte	1%	0 to 100
	4258	Current 27th harmonic B	byte	1%	0 to 100
	4259	Current 28th harmonic B	byte	1%	0 to 100
	4260	Current 29th harmonic B	byte	1%	0 to 100
	4261	Current 30th harmonic B	byte	1%	0 to 100
	4262	Current 31st harmonic B	byte	1%	0 to 100
	4263	Current 32nd harmonic B	byte	1%	0 to 100
	4264	Current fundamental harmonic C	byte	1%	0 to 100
	4265	Current 2nd harmonic C	byte	1%	0 to 100
	4266	Current 3rd harmonic C	byte	1%	0 to 100
	4267	Current 4th harmonic C	byte	1%	0 to 100
	4268	Current 5th harmonic C	byte	1%	0 to 100
	4269	Current 6th harmonic C	byte	1%	0 to 100
	4270	Current 7th harmonic C	byte	1%	0 to 100
	4271	Current 8th harmonic C	byte	1%	0 to 100
	4272	Current 9th harmonic C	byte	1%	0 to 100
	4273	Current 10th harmonic C	byte	1%	0 to 100
	4274	Current 11th harmonic C	byte	1%	0 to 100
	4275	Current 12th harmonic C	byte	1%	0 to 100
	4276	Current 13th harmonic C	byte	1%	0 to 100
	4277	Current 14th harmonic C	byte	1%	0 to 100
	4278	Current 15th harmonic C	byte	1%	0 to 100
	4279	Current 16th harmonic C	byte	1%	0 to 100
	4280	Current 17th harmonic C	byte	1%	0 to 100
	4281	Current 18th harmonic C	byte	1%	0 to 100

Table 5: Harmonics data registers (cont'd)

	Read Only (function code 0x03 or 0x04)				
	Register	**Description**	**Type**	**Min unit**	**Range**
Harmonics Data	4282	Current 19th harmonic C	byte	1%	0 to 100
	4283	Current 20th harmonic C	byte	1%	0 to 100
	4284	Current 21st harmonic C	byte	1%	0 to 100
	4285	Current 22nd harmonic C	byte	1%	0 to 100
	4286	Current 23rd harmonic C	byte	1%	0 to 100
	4287	Current 24th harmonic C	byte	1%	0 to 100
	4288	Current 25th harmonic C	byte	1%	0 to 100
	4289	Current 26th harmonic C	byte	1%	0 to 100
	4290	Current 27th harmonic C	byte	1%	0 to 100
	4291	Current 28th harmonic C	byte	1%	0 to 100
	4292	Current 29th harmonic C	byte	1%	0 to 100
	4293	Current 30th harmonic C	byte	1%	0 to 100
	4294	Current 31st harmonic C	byte	1%	0 to 100
	4295	Current 32nd harmonic C	byte	1%	0 to 100
	4296	Voltage fundamental harmonic AN	byte	1%	0 to 100
	4297	Voltage 2nd harmonic AN	byte	1%	0 to 100
	4298	Voltage 3rd harmonic AN	byte	1%	0 to 100
	4299	Voltage 4th harmonic AN	byte	1%	0 to 100
	4300	Voltage 5th harmonic AN	byte	1%	0 to 100
	4301	Voltage 6th harmonic AN	byte	1%	0 to 100
	4302	Voltage 7th harmonic AN	byte	1%	0 to 100
	4303	Voltage 8th harmonic AN	byte	1%	0 to 100
	4304	Voltage 9th harmonic AN	byte	1%	0 to 100
	4305	Voltage 10th harmonic AN	byte	1%	0 to 100
	4306	Voltage 11th harmonic AN	byte	1%	0 to 100
	4307	Voltage 12th harmonic AN	byte	1%	0 to 100
	4308	Voltage 13th harmonic AN	byte	1%	0 to 100
	4309	Voltage 14th harmonic AN	byte	1%	0 to 100
	4310	Voltage 15th harmonic AN	byte	1%	0 to 100
	4311	Voltage 16th harmonic AN	byte	1%	0 to 100
	4312	Voltage 17th harmonic AN	byte	1%	0 to 100
	4313	Voltage 18th harmonic AN	byte	1%	0 to 100
	4314	Voltage 19th harmonic AN	byte	1%	0 to 100
	4315	Voltage 20th harmonic AN	byte	1%	0 to 100
	4316	Voltage 21st harmonic AN	byte	1%	0 to 100
	4317	Voltage 22nd harmonic AN	byte	1%	0 to 100
	4318	Voltage 23rd harmonic AN	byte	1%	0 to 100
	4319	Voltage 24th harmonic AN	byte	1%	0 to 100
	4320	Voltage 25th harmonic AN	byte	1%	0 to 100
	4321	Voltage 26th harmonic AN	byte	1%	0 to 100
	4322	Voltage 27th harmonic AN	byte	1%	0 to 100
	4323	Voltage 28th harmonic AN	byte	1%	0 to 100
	4324	Voltage 29th harmonic AN	byte	1%	0 to 100
	4325	Voltage 30th harmonic AN	byte	1%	0 to 100
	4326	Voltage 31st harmonic AN	byte	1%	0 to 100
	4327	Voltage 32nd harmonic AN	byte	1%	0 to 100

Table 5: Harmonics data registers (cont'd)

	Read Only (function code 0x03 or 0x04)				
	Register	**Description**	**Type**	**Min unit**	**Range**
Harmonics Data	4328	Voltage fundamental harmonic BN	byte	1%	0 to 100
	4329	Voltage 2nd harmonic BN	byte	1%	0 to 100
	4330	Voltage 3rd harmonic BN	byte	1%	0 to 100
	4331	Voltage 4th harmonic BN	byte	1%	0 to 100
	4332	Voltage 5th harmonic BN	byte	1%	0 to 100
	4333	Voltage 6th harmonic BN	byte	1%	0 to 100
	4334	Voltage 7th harmonic BN	byte	1%	0 to 100
	4335	Voltage 8th harmonic BN	byte	1%	0 to 100
	4336	Voltage 9th harmonic BN	byte	1%	0 to 100
	4337	Voltage 10th harmonic BN	byte	1%	0 to 100
	4338	Voltage 11th harmonic BN	byte	1%	0 to 100
	4339	Voltage 12th harmonic BN	byte	1%	0 to 100
	4340	Voltage 13th harmonic BN	byte	1%	0 to 100
	4341	Voltage 14th harmonic BN	byte	1%	0 to 100
	4342	Voltage 15th harmonic BN	byte	1%	0 to 100
	4343	Voltage 16th harmonic BN	byte	1%	0 to 100
	4344	Voltage 17th harmonic BN	byte	1%	0 to 100
	4345	Voltage 18th harmonic BN	byte	1%	0 to 100
	4346	Voltage 19th harmonic BN	byte	1%	0 to 100
	4347	Voltage 20th harmonic BN	byte	1%	0 to 100
	4348	Voltage 21st harmonic BN	byte	1%	0 to 100
	4349	Voltage 22nd harmonic BN	byte	1%	0 to 100
	4350	Voltage 23rd harmonic BN	byte	1%	0 to 100
	4351	Voltage 24th harmonic BN	byte	1%	0 to 100
	4352	Voltage 25th harmonic BN	byte	1%	0 to 100
	4353	Voltage 26th harmonic BN	byte	1%	0 to 100
	4354	Voltage 27th harmonic BN	byte	1%	0 to 100
	4355	Voltage 28th harmonic BN	byte	1%	0 to 100
	4356	Voltage 29th harmonic BN	byte	1%	0 to 100
	4357	Voltage 30th harmonic BN	byte	1%	0 to 100
	4358	Voltage 31st harmonic BN	byte	1%	0 to 100
	4359	Voltage 32nd harmonic BN	byte	1%	0 to 100
	4360	Voltage fundamental harmonic C	byte	1%	0 to 100
	4361	Voltage 2nd harmonic CN	byte	1%	0 to 100
	4362	Voltage 3rd harmonic CN	byte	1%	0 to 100
	4363	Voltage 4th harmonic CN	byte	1%	0 to 100
	4364	Voltage 5th harmonic CN	byte	1%	0 to 100
	4365	Voltage 6th harmonic CN	byte	1%	0 to 100
	4366	Voltage 7th harmonic CN	byte	1%	0 to 100
	4367	Voltage 8th harmonic CN	byte	1%	0 to 100
	4368	Voltage 9th harmonic CN	byte	1%	0 to 100
	4369	Voltage 10th harmonic CN	byte	1%	0 to 100
	4370	Voltage 11th harmonic CN	byte	1%	0 to 100
	4371	Voltage 12th harmonic CN	byte	1%	0 to 100
	4372	Voltage 13th harmonic CN	byte	1%	0 to 100
	4373	Voltage 14th harmonic CN	byte	1%	0 to 100

Table 5: Harmonics data registers (cont'd)

	Read Only (function code 0x03 or 0x04)				
	Register	**Description**	**Type**	**Min unit**	**Range**
Harmonics Data	4374	Voltage 15th harmonic CN	byte	1%	0 to 100
	4375	Voltage 16th harmonic CN	byte	1%	0 to 100
	4376	Voltage 17th harmonic CN	byte	1%	0 to 100
	4377	Voltage 18th harmonic CN	byte	1%	0 to 100
	4378	Voltage 19th harmonic CN	byte	1%	0 to 100
	4379	Voltage 20th harmonic CN	byte	1%	0 to 100
	4380	Voltage 21st harmonic CN	byte	1%	0 to 100
	4381	Voltage 22nd harmonic CN	byte	1%	0 to 100
	4382	Voltage 23rd harmonic CN	byte	1%	0 to 100
	4383	Voltage 24th harmonic CN	byte	1%	0 to 100
	4384	Voltage 25th harmonic CN	byte	1%	0 to 100
	4385	Voltage 26th harmonic CN	byte	1%	0 to 100
	4386	Voltage 27th harmonic CN	byte	1%	0 to 100
	4387	Voltage 28th harmonic CN	byte	1%	0 to 100
	4388	Voltage 29th harmonic CN	byte	1%	0 to 100
	4389	Voltage 30th harmonic CN	byte	1%	0 to 100
	4390	Voltage 31st harmonic CN	byte	1%	0 to 100
	4391	Voltage 32nd harmonic CN	byte	1%	0 to 100

Table 6: Settings data registers

	Read or write (function code 0x03, 0x04 or 0x04)				
	Register	**Description**	**Type**	**Min unit**	**Range**
Settings Data	100	PT primary voltage	word	1V	60 to 50000
	101	PT secondary voltage	word	1V	60 to 300
	102	CT primary current	word	1A	5 to 50000
	103	CT secondary current	word	5A	-
	104	Power demand interval	word	1sec	60 to 1800
	105	Power demand sub interval	byte	-	2 to 120
	106	Current demand interval	word	1sec	60 to 1800
	107	Current demand sub interval	byte	-	2 to 120
	111	Clock minute	BCD	1min	0 to 5 : 0 to 9
	112	Clock hour	BCD	1hr	0 to 2 : 0 to 9
	113	Day of month	BCD	1day	0 to 3 : 0 to 9

NOTE

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