```
REVALCO RANM8 registers
      (firmware ver.433e -> G433R8.src )
(firmware ver.413e -> G413R3.src )
```

0120

voltage L1 harmonics

harm.no. 1

______ GENERAL

GENERAL					
rea addr	description		modbu	c	data
(word)	-		RD cmd.		type
0000	config.flags/enr	.rec.pointer	03	06	1A
0001	dig.in mode/conf:	ig.	03	06	1B
0002	dig.out.config.		03	06	1C
0003	dig.out1 alarm mo	ode/delay	03	06	1D
0004	dig.out2 alarm mo	ode/delay	03	06	1D
0005	dig.I/O status		03	06	1E
0006	command reg.		03	06	1F
0010	voltage transf.fa		03	06	2A
0011	current transf.fa	, ,	03	06	2B
0012	-	t factor (CIF)		06	2C
0013		t factor (CIF)			2C
0014	dig.out1 threshol		03		2 D
0015	dig.out2 threshol	ld	03	06	2D
0800	U1 scaling factor	^	04	_	2E
0081	Il scaling factor		04	_	2E
0082	PQS1 scaling fact		04	_	2E
0083	U2 scaling factor		04	_	2E
0084	I2 scaling factor		04	_	2E
0085	PQS2 scaling fact		04	_	2E
0086	U3 scaling factor		04	_	2E
0087	I3 scaling factor		04	_	2E
0088	PQ3 scaling factor		04	_	2E
	Ptot scaling fact		04	_	2E
008A	PSOTF transform		04	_	2E
			-		
0090	ser.number	(8 ASCII chr.)	04	_	
00A0	model	(12 ASCII chr.)	04	_	
00B0	version	(4 ASCII chr.)	04	_	

_____ L1

reg.addr. (word)	description	modbu RD cmd.		data type
0100	frequency	04	_	3
0101	voltage L1	04	-	4 A
0102	" scan.peak	04	_	4 A
0103	_			
0104	_			
0105	current L1	04	-	4B
0106	" " scan.peak	04	_	4 A
0107	-			
0108	-			
0109	activ.power L1 (lo)	04	-	5A
010A	activ.power L1 (hi)			
010B	appar.power L1 (lo)	04	_	5A
010C	appar.power L1 (hi)			
010D	react.power L1 (lo)	04	_	5A
010E	react.power L1 (hi)			_
010F	power factor L1	04	_	6
0110	(L1-L2) voltage	04	_	4A

9A

```
0121
      harm.no. 2
     harm.no. 3
0122
0123
      harm.no. 4
      harm.no. 5
0124
0125
      harm.no. 6
0126
       harm.no.
0127
       harm.no. 8
0128
      harm.no. 9
0129
      harm.no. 10
012A
    harm.no. 11
012B
       harm.no. 12
012C
       harm.no. 13
      harm.no. 14
012D
012E
      harm.no. 15
012F
      harm.no. 16
0130
      harm.no. 17
0131
       harm.no. 18
      harm.no. 19
0132
0133
      harm.no. 20
0134
      harm.no. 21
0135
      harm.no. 22
0136
       harm.no. 23
0137
       harm.no. 24
      harm.no. 25
0138
0139
      harm.no. 26
013A
      harm.no. 27
013B
      harm.no. 28
013C
       harm.no. 29
      harm.no. 30
013D
013E
      harm.no. 31
013F
      harm.no. 32
    current L1 harmonics
     harm.no. 1
0150
      harm.no. 2
0151
0152
      harm.no. 3
0153
      harm.no. 4
      harm.no. 5
0154
0155
       harm.no. 6
      harm.no. 7
0156
      harm.no. 8
0157
0158
      harm.no. 9
0159
      harm.no. 10
015A
       harm.no. 11
015B
       harm.no. 12
015C
      harm.no. 13
015D
      harm.no. 14
015E
      harm.no. 15
      harm.no. 16
015F
0160
       harm.no. 17
      harm.no. 18
0161
      harm.no. 19
0162
0163 harm.no. 20
0164 harm.no. 21
0165
       harm.no. 22
0166
       harm.no. 23
0167
      harm.no. 24
0168
      harm.no. 25
0169
      harm.no. 26
      harm.no. 27
016A
016B
       harm.no. 28
      harm.no. 29
016C
016D
      harm.no. 30
016E
      harm.no. 31
016F
      harm.no. 32
______
reg.addr. description
                                           modbus
                                                             data
                                       RD cmd. WR cmd. type
```

(Word) RD Cmd. WR Cmd. type

0000	6	0.4		2
0200 0201	frequency voltage L2	04 04	_	3 4A
0201	" " scan.peak	04		4A
0203	-			
0204	_			
0205	current L2	04	-	4B
0206	" " scan.peak	04	_	4A
0207 0208				
0200	activ.power L2 (lo)	04	_	5A
020A	activ.power L2 (hi)	0 1		011
020B	appar.power L2 (lo)	04	_	5A
020C	appar.power L2 (hi)			
020D	react.power L2 (lo)	04	-	5A
020E 020F	react.power L2 (hi)	04		6
0201	power factor L2 (L2-L3) voltage	04	_	6 4A
0210	(12 13) Voleage	0 1		111
	voltage L2 harmonics			
0220	harm.no. 1	04	_	9A
0221	harm.no. 2			
0222	harm.no. 3			
0223 0224	harm.no. 4 harm.no. 5			
0224	harm.no. 6			
0226	harm.no. 7			
0227	harm.no. 8			
0228	harm.no. 9			
0229	harm.no. 10			
022A	harm.no. 11			
022B 022C	harm.no. 12 harm.no. 13			
022D	harm.no. 14			
022E	harm.no. 15			
022F	harm.no. 16			
0230	harm.no. 17			
0231	harm.no. 18			
0232 0233	harm.no. 19			
0233	harm.no. 20 harm.no. 21			
0235	harm.no. 22			
0236	harm.no. 23			
0237	harm.no. 24			
0238	harm.no. 25			
0239 023A	harm.no. 26 harm.no. 27			
023A 023B	harm.no. 28			
023B	harm.no. 29			
023D	harm.no. 30			
023E	harm.no. 31			
023F	harm.no. 32			
0250	current L2 harmonics harm.no. 1			
0250	harm.no. 2			
0252	harm.no. 3			
0253	harm.no. 4			
0254	harm.no. 5			
0255	harm.no. 6			
0256 0257	harm.no. 7 harm.no. 8			
0257	harm.no. 9			
0259	harm.no. 10			
025A	harm.no. 11			
025B	harm.no. 12			
025C	harm.no. 13			
025D 025E	harm.no. 14			
025E 025F	harm.no. 15 harm.no. 16			
0251	harm.no. 17			
0261	harm.no. 18			
0262	harm.no. 19			
0263	harm.no. 20			
0264	harm.no. 21			

0265	harm.no.	22
0266	harm.no.	23
0267	harm.no.	24
0268	harm.no.	25
0269	harm.no.	26
026A	harm.no.	27
026B	harm.no.	28
026C	harm.no.	29
026D	harm.no.	30
026E	harm.no.	31
026F	harm.no.	32

T	-
Ι.	-

reg.ad	ddr. description	modbu RD cmd.	WR cmd.	data
(Word	a) 	RD CMa.	wk cma.	type
0300	frequency	04	_	3
0301	voltage L3	04	_	4A
0302	" " scan.peak	04	_	4A
0303	_			
0304	-			
0305	current L3	04	-	4B
0306	" " scan.peak	04	-	4 A
0307	-			
0308	-			
0309	activ.power L3 (lo)	04	-	5A
030A	activ.power L3 (hi)			_
030B	appar.power L3 (10)	04	_	5A
030C	appar.power L3 (hi)	0.4		
030D	react.power L3 (10)	04	_	5A
030E	react.power L3 (hi)	0.4		
030F	power factor L3	04	_	6
0310	(L3-L1) voltage	04	_	4 A
0320	voltage L3 harmonics	0.4		0.7
0320	harm.no. 1	04	-	9A
0321	harm.no. 2 harm.no. 3			
0322	harm.no. 4			
0323	harm.no. 5			
0325	harm.no. 6			
0326	harm.no. 7			
0327	harm.no. 8			
0328	harm.no. 9			
0329	harm.no. 10			
032A	harm.no. 11			
032B	harm.no. 12			
032C	harm.no. 13			
032D	harm.no. 14			
032E	harm.no. 15			
032F	harm.no. 16			
0330	harm.no. 17			
0331	harm.no. 18			
0332	harm.no. 19			
0333	harm.no. 20			
0334	harm.no. 21			
0335	harm.no. 22			
0336	harm.no. 23			
0337	harm.no. 24			
0338 0339	harm.no. 25 harm.no. 26			
0339 033A	harm.no. 26			
033A 033B	harm.no. 28			
033E	harm.no. 29			
033D	harm.no. 30			
033E	harm.no. 31			
033E	harm.no. 32			

current L3 harmonics 0350 harm.no. 1

0351	harm.no.	2
0352	harm.no.	3
0353	harm.no.	4
0354	harm.no.	5
0355	harm.no.	6
0356	harm.no.	7
0357	harm.no.	8
0358	harm.no.	9
0359	harm.no.	10
035A	harm.no.	11
035B	harm.no.	12
035C	harm.no.	13
035D	harm.no.	14
035E	harm.no.	15
035F	harm.no.	16
0360	harm.no.	17
0361	harm.no.	18
0362	harm.no.	19
0363	harm.no.	20
0364	harm.no.	21
0365	harm.no.	22
0366	harm.no.	23
0367	harm.no.	24
0368	harm.no.	25
0369	harm.no.	26
036A		27
036B	harm.no.	28
036C	harm.no.	29
036D	harm.no.	30
036E	harm.no.	31
036F	harm.no.	32

- 7	$\Gamma \cap$	T(Ά	Т	.S

reg.addr. (word)	description	modbus RD cmd.	WR cmd.	data type
0400 0401	total activ power (lo)	04	-	5в
0402 0403	total react.power (lo) " " (hi)	04	-	5B
0404 0405	total appar.power (lo) " " (hi)	04	-	5B
0406	total power factor	04	_	6
0407 0408	frequency -	04	-	3 (ver.433E)
0409 040A 040B	•	.o) 04 nid)	-	7A
040B 040C 040D 040E	total negative activ.energy (1	•	-	7A
040F 0410 0411	total positive react.energy (1		-	7A
0412 0413 0414	total negative react.energy (1		-	7A
0415 0416 0417	•	(lo) 04 (mid) (hi)	-	7A
0418 0419 041A	tarif1 negative activ.energy (,	_	7A
041A 041B 041C 041D	tarif1 positive react.energy (· ,	-	7A
041E	tarifl negative react.energy (· ,	_	7A

041F	"	11	"	(mid)			
0420	"	"	"	(hi)			
0421	tarif2	positive	activ.energy	(10)	04	_	7A
0422	"	"	11	(mid)			
0423	"	**		(hi)	0.4		
0424 0425	tarii2	negative	activ.energy	(lo)	04	_	7A
0425	"	"	"	(mid) (hi)			
0427	tarif2	positive	react.energy	(10)	04	_	7A
0428	"	"	"	(mid)	0 1		,
0429	"	"	11	(hi)			
042A			react.energy	(10)	04	-	7A
042B	"	"	"	(mid)			
042C	"	"	"	(hi)			
042D	tarif3	positive	activ.energy	(10)	04	_	7A
042E	"	11	"	(mid)			
042F	"	" .	" .	(hi)			_
0430	tarif3	negative	activ.energy	(10)	04	_	7A
0431 0432	"	"	"	(mid)			
0432			react.energy	(hi) (lo)	04	_	7A
0434	"	"	"	(mid)	0 1		/ 11
0435	"	"	"	(hi)			
0436	tarif3	negative	react.energy	(10)	04	_	7A
0437	"	"	11	(mid)			
0438	"	"	"	(hi)			
0439	tarif4	positive	activ.energy	(10)	04	_	7A
043A	"	"	"	(mid)			
043B	"	"	"	(hi)			
043C	tarif4	negative	activ.energy	(10)	04	_	7A
043D	"	"	"	(mid)			
043E 043F			react.energy	(hi) (lo)	04	_	7A
0440	"	"	"	(mid)	0 1		/ 11
0441	"	11	11	(hi)			
0442	tarif4	negative	react.energy	(10)	04	_	7A
0443	"	"	"	(mid)			
0444	"	"	"	(hi)			
0445	input	counter1	(10)		04	-	8
0446	"		(mid)				
0447	"		(hi)		0.4		0
0448 0449	input		(lo)		04	_	8
0449 044A	"		(mid) (hi)				
OTIN			(111)				
044B	activ	energy (al	bsolute IP max	(lo)	04	-	7в
044C				(mid)			
044D			-11 TD	(hi)	0.4		7.0
044E 044F	reacti	v energy(absolute IP ma	(mid)	04	_	7В
0450				(hi)			
0451	ac+i+	energy (la	aet TD\	(10)	04	_	7в
0451	activ (enerdă (T	uol IF)	(10) (mid)	UT		10
0453				(hi)			
0454	reacti	v energy	(last IP)	(10)	04	_	7в
0455			•	(mid)			
0456				(hi)			

0600 OCD7

Total Harmonics distorsion

reg.addr.	description	modbus	data
(word)		RD cmd. WR cmd.	type

```
0500
         voltage thd L1
                                                 04
                                                                         9В
         current thd L1
                                                                         9B
0501
                                                 0.4
         voltage thd L2
0502
                                                 04
0503
                                                 04
                                                                         9 B
         current thd L2
0504
         voltage thd L3
                                                 0.4
                                                                         9B
0505
         current thd L3
                                                 04
                                                                         9В
```

Energy recorder

(note description for config.flags/energy recorder pointer ,reg.addr. 0)

-	description		modk		data	
(word)			RD cmd.	WR cmd.	type	
0600	activ.energy	(10)	04	_ .	7A	
0601	"	(mid)				
0602	II .	(hi)				
0603	react.energy	(10)	04	_	7A	
0604	"	(mid)				
0605	II .	(hi)				
		` ,				
•						
•						
•						
0966	activ.energy	(10)	04	-	7A	
0967	11	(mid)				
0968	"	(hi)				
0969	react.energy	(10)	04	-	7A	
096A	"	(mid)				
096B	"	(hi)				

Data types

```
1A config.flags/energy recorder pointer (flags)
```

low byt:

high byt: (bits 8...15)

```
Energy recorder actually pointer (ERP)
  FFh = no records
  00h ... 91h = no.of last records
  ( real modbus reg.addr. for read = ERP * 6 + 600h )
  ( reg.addr.range = 0600h ... 0966h )
```

Description:

```
digital inputs mode/config.
(bcd)
                  bit 7 6 5 4 3 2 1 0 (bits 15...8 =0)
                                               0 ----- 0 ----- 1 ----- 1 -
0 ----- 1 ----- 0 ----- 1 ----
  input1: cnt.1 IPsync cnt.1 cnt.1 input2: tar.1/2 tar.1/2 tar.1/2 tar.1/2 input3: tat.3/4 tar.3/4 tar.3/4 IPsync input4: cnt.2 cnt.2 IPsync cnt.2
  (IPsync: internal input1 input4 input3)
1C digital outputs config.
(bcd)
                       --output2--
                                     --output1--
                         6 5 4 3 2 1 0
                                                   (bits 15...8 = 0)
                        __refer__| |_refer__
table table
            no opearation (OFF)
          0
             pulse out (kWh)
             pulse out (kVArh)
          2
             alarm Pt (tot.activ.power)
alarm Qt (tot.react.power)
alarm I1 (curr.L1)
          3
          5
             alarm I2 (curr.L2)
          6
          7
             alarm I3 (curr.L3)
             no operation (ON)
          8
             alarm Ix (curr. L1orL2orL3)
alarm U1 (volt.L1)
alarm U2 (volt.L2)
          9
          В
             alarm U3 (volt.L3)
          D alarm Ux (volt. L1orL2orL3)
          E alarm Hz (frequency)
F alarm Pft (total power factor)
______
1D digital outputs alarm mode/delay time
(flags/bcd)
                  bit 7 6 5 4 3 2 1 0 (bits 15...8 =0)
                                     | delay |
                                     | 0..15 sec |
                   alarm mode
                     0 - over.
                     1 - under.
1E digital in/out status
(flags)
                 bit 7 6 5 4 3 2 1 0 (bits 15...8 = 0)
                      out2 |
                     inp4 |
```

```
______
1F command/status register
(flags)
                 bit 7 6 5 4 3 2 1 0 (bits 15...8 =0)
                                  1
                                  1 - clear energy counerts
                        1 - execute | |
                       command | | 1 - clear input pulse counerts
                                 | 1 - save config./param.
                     0 - o.k.
                     1 - error
                   command status 1 - clear maximum IP energy regs.
 ______
2A voltage transf.factor 1 .. 70 (500V range) (bin) (VTF) 1 .. 120 (300V range)
                             1 .. 240 (150V range)
2B current transf.factor 1 .. 2000 (--> 5/5A .... 10000/5A)
       (CTF)
(bin)
                                      (--> CTF=curr.range/5)
2C digital inputs caunerts increment factor (bin) (CIF)
       (CIF)
                         0 .... 10000 (= 0.0 ... 100.00 per input pulse)
2D 1. digital output threshold (value range depending of dig.inp.config.)
         (for alarm.comparation or calc.out.energy pulse)
       out.mode
                                            value
            no opearation (OFF)
            pulse out (kWh)
                                           note 1
         2
            pulse out (kVArh)
            alarm Pt (tot.activ.power)
alarm Qt (tot.react.power)
alarm I1 (curr.L1)
         3
         5
            alarm I2 (curr.L2)
         6
         7
             alarm I3 (curr.L3)
         8
            no operation (ON)
             alarm Ix (curr. L1orL2orL3)
alarm U1 (volt.L1)
         9
         Α
            alarm U2 (volt.L2)
         В
           alarm Ux (volt.L3) "
alarm Hz (frequency) "
         D
         E
             alarm Pft (total power factor) "
          note 1: value= 2 for 0.001/pulse [kW][kVAr]
                         3 0.01/pulse
                         4
                              0.1/pulse
                             1/pulse
                         5
                  value= 10485760 * power / PSQscale /PSQT
                        (power: 0 .... Urange*VTF*5*CTF) [W] or [VAr]
                   !!! USE ONLY HI-WORD OF CALCULATED VALUED
          note 3: value= current[A] * 1024000 /Iscale / CTF
                         (current: 0 .... Irange)
```

| inp2 | |

| RD only |

inp1 | inp3 out1

```
(voltage: 0 .... Urange*VTF)
           note 5: freq*100 ,min.freq=45Hz ,max.freq.=65Hz
           (range: 4500 .... 6500)
note 6: power factor * 100
                        (range: 0...100)
     2. digital output threshold
          (for power demand mode)
           value= 10485760 * power / PSQscale /PSQT
                   (power: 0 .... Urange*VTF*5*CTF) [W] or [VAr]
                  !!! USE ONLY HI-WORD OF CALCULATED VALUED
2E scales
(bin)
3 frequency (step 0.01 Hz) (bin) (real data = req.value /
        (real data = reg.value / 100)
      voltage = reg.data * Uscale / 1024 * VTF /10 [V]
4B current = reg.data * Iscale / 1024 * CTF /1000 [A]
            ( note: CTF=curr.range/5)
5A power = reg.data * PSQscale / 1048576 * PSQT /10 [W][VA][VA]
(bin 2words)
5b power (step 0.1 [W],[VA],[VAr])
(bin 2words)
       low byt = Pf (real data = reg.value / 100)
                  (if reg.value is FFh , Pf=undefined)
        high byt = power attributes
                  bit 7 6 5 4 3 2 1 0
                             if 1 \mid 0 - posit. \mid 0 - inductive Pf=1 \mid 1 - negat. \mid 1 - capacitive
                                             Q
                             if 1
                                             0 - negative
                            if 1 U - negative P=S=Q=0 1 - positive
                           (Pf=undefined)
7A energy (step 0.01 [kWh], [VArh])
(bin 3words)
                   lsb word
.. .. lsb
         msb word
              .. .. .. .. byt byt byt
        msb
                                   byt
        byt
                  mantisa
              multiplier
             (0...100)
        real data = mantisa + multiplier * 100000000
```

note 4: value= voltage[V] * 10240 /Uscale / VTF

```
______
7B energy (step 0.01 [kWh], [VArh])
(bin 3words)
     msb word
     msb
         byt byt byt byt
     byt
            |___ 32 bit bin ____|
| mantis
         X
     real data = mantisa
______
8 counters (step=CIF)
(bin 3 words)
             .. ..
     msb
                    .. lsb
     byt byt byt byt byt
         mantisa
        multiplier
        (0...100)
     real data = mantisa + multiplier * 100000000
9A
    Harmonics
(bin)
     real data = req.value / 10 (%)
     note: Harmonics are normalized(vs harm.no.1 ).
         Harm.no.1 (fundamental) is 100%.
9B
(bin)
    real data = reg.value / 10 (%)
MODBUS commands
______
command 03 read holding register (max. 1 reg.)
MASTER: byt 1. 2.
                       4.
                   3.
                            5. 6.
                                     7.
          slave 03 hi addr. req.a
                           hi lo lo hi no.of.regs. crc
                       10
                    reg.addr.
SLAVE: byt 1. 2. 3. 4. 5. 6. 7.
                  no.of lo hi lo hi
bytes data reg.1 crc
          slave 03 no.of lo hi
          addr.
   -----
command 04 read input/data register (max. 16 regs.)
MASTER: byt 1.
              2.
                   3.
                       4.
                            5. 6.
                                     7.
          slave 04 hi lo hi lo lo daddr. reg.addr. no.of.regs. crc
     byt 1. 2. 3. 4. 5. .. .. ..
SLAVE:
```

slave 04 no.of lo hi lo hi lo hi addr. bytes data reg.1 data reg.n crc

command 06 preset holding register (max. 1 reg.)

MASTER: byt 1. 2. 3. 4. 5. 6. 7. 8.

slave addr. 06 hi lo hi reg.data(wr) 10 crc

SLAVE: byt 1. 2. 3. 4. 5. 6. 7. 8.

slave addr. 10 hi lo hi lo hi reg.data(rd) crc
