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Determining the place of installation of the voltage adjustment device in low-voltage power networks

Usmanov EG , Khusanov BM

Candidate of technical sciences, Professor, Tashkent state technical university, Uzbekistan,
Senior teacher, Department of power supply, Tashkent state technical university, Uzbekistan

ABSTRACT: Electric energy of the field economic mechanism changes with electricity in networks electricity energy waste reduce problem not only own importance did not lose, maybe electricity supply organizations financial stability of provision main of duties to one became in branched networks with a large number of consumers of electricity, the randomness of the occurrence of electric loads, as well as the randomness of the voltage over time.

KEYWORDS: electricity energy waste, nominal voltage, electricity network, electricity energy quality, voltage deviation.

I. INTRODUCTION

The main issue in the design of installation of KRT in electrical networks is the correct determination of electrical loads. Estimated maximum loads (the largest loads in half an hour at the end of the billing period) are determined for daytime P_{day} (Q_{day}) and evening P_{night} (Q_{night}) [1].

At the entrance to improved apartments in cities and villages of urban type, the calculated load was 4 kW with gasification and 5 kW without gasification, 6 kW in residential buildings with electric stoves, 7,5 kW with electric stoves and water heaters. In the presence of household air conditioners, the calculated loads are increased by 1 kW. The external lighting load of the area of business centers is 250 W per room and 3 W per meter of the perimeter of the farm yard, the external lighting of shopping centers and squares is equal to 0,5 W/m^2 [2].

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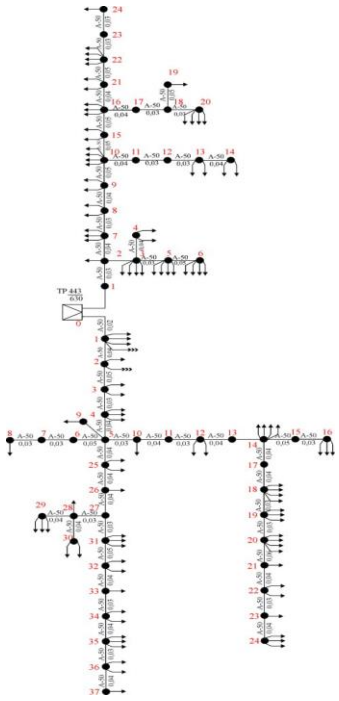

Figure 1. 0.4 kV network supports location scheme

Consumers of the group accounting download $K_{one\ time}$ one-time lines coefficient using is determined, this combined maximum upload value individual of consumers maximum downloads in total from the ratio is considered Downloads, rule as day time and evening maximum regimes for separately is determined. If only work release consumers from the network power will receive if, then count only daytime hours for done increase can If consumers only house hold conditions if, then only evening mode count can Calculations simplification for daytime and evening maximum K_{day} and its evening coefficients is used. Work release consumers for, they are equal to K_{day} =1, K_{night} =0.6 received electricity stoves didn't happen household consumers for K_{day} =0.3... 0.4, K K_{night} =1 and electricity with plates K_{day} =0.6, K_{night} =1; mixed downloads for K_{day} = K_{night} =1 [3].

0,4 kV in HL sections one character consumers of the group daily and evening accounting downloads the following determined by formulas:

$$P_{\text{day}} = K_{one\ time} \cdot \sum P_{\text{day}.i} \quad (1)$$

$$P_{\text{night}} = K_{one\ time} \cdot \sum P_{\text{night}.i} \quad (2)$$

this on the ground $K_{one\ time}$- one timeliness coefficient, $P_{\text{day}.i}$, $P_{\text{night}.i}$- consumers group at the entrance, line in the section, transformer substation (TP) tires daytime and evening accounting download.

If in the group of consumers downloads value from 4 times more difference if he does, they are summarized. In this, P_{max} is added of downloads the biggest value, $P_{additional}$ - while don't download small to the part addition download

$$R = R_{max} + R_{extra} \quad (3)$$

Data in table 1, residence buildings, public, communal institutions and industry consumers with network in the plots common project downloads to determine for is used. Har one of the group accounting downloads, in them consumers to the number according to coming one temporality coefficients using is found. Same that's it from the method using a transformer of point in the tires accounting downloads to determine can [4].

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Table 1
0,4 kV tense in networks common downloads for addition power values

P	*Double P*	*P*	*Double P*	*P*	*Double P*	*P*	*double*
0.2	+0.2	12	+7.3	50	+34.0	170	+123
0.4	+0.3	14	+8.5	55	+37.5	180	+130
0.6	+04	16	+9.8	60	+41.0	190	+140
0.8	+0.5	18	+11.2	65	+44.5	200	+150
1.0	+0.6	20	+12.5	70	+48.0	210	+158
2.0	+1.2	22	+13.8	80	+55.0	220	+166
3.0	+1.8	24	+15.0	90	+62.0	230	+174
4.0	+2.4	26	+16.4	100	+69.0	240	+182
5.0	+3.0	28	+17.7	110	+76	250	+190
6.0	+3.6	30	+19.0	120	+84	260	+198
7.0	+4.2	32	+20.4	130	+92	270	+206
8.0	+4.8	35	+22.8	140	+100	280	+214
9.8	+5.4	44	+26.5	150	+108	290	+222
10	+6.0	45	+30.2	160	+116	330	+230

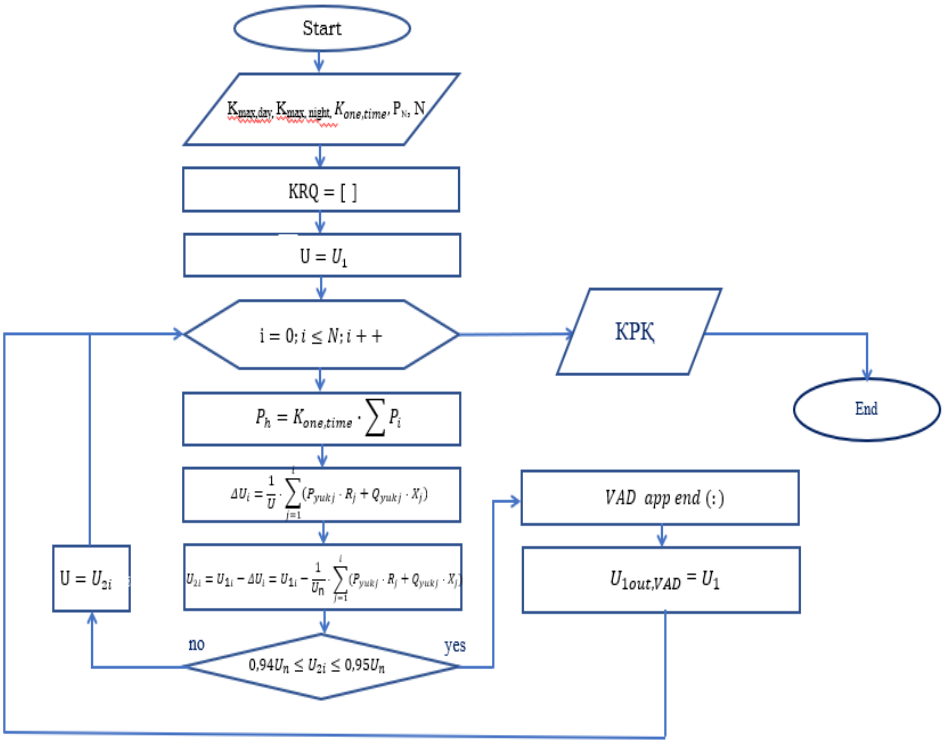

Figure 2. Algorithm for determining the location of VAD installation

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From the above come VAD shown in Figure 1 0,4 kV tense village electricity in networks installation the place count algorithm work released to GOST 13109-97 according to, normal permission done deviations within electricity acceptance of the doers in the clamps the voltage should be 220±5% need VAD placing of the consumer maximum download with with a voltage of at least 209 V in case done increase need [5-6].

$K_{one\ time}$=0,53, P_{his}=7,1 kW, PBV in the hour zero

Plot	U, [V]			δU%		
	A	B	C	A	B	C
	220	220	220			
1	219,2	219,1	219,2	-0,4%	-0,4%	-0,3%
2	215,6	214,8	215,7	-2,0%	-2,4%	-1,9%
3	212,8	211,4	212,9	-3,3%	-3,9%	-3,2%
4	209,9	207,7	209,8	-4,6%	-5,6%	-4,6%
5	206,9	203,8	206,5	-5,9%	-7,4%	-6,1%
6	206,7	203,8	206,5	-6,0%	-7,4%	-6,1%
7	206,6	203,8	206,5	-6,1%	-7,4%	-6,1%
8	206,4	203,8	206,5	-6,2%	-7,4%	-6,1%
9	206,9	203,6	206,5	-5,9%	-7,4%	-6,1%
10	205,9	202,1	205,2	-6,4%	-8,1%	-6,7%
11	204,7	200,3	203,7	-7,0%	-9,0%	-7,4%
12	203,9	199,1	202,6	-7,3%	-9,5%	-7,9%
13	202,7	197,5	201,2	-7,9%	-10,2%	-8,5%
14	201,3	195,7	199,6	-8,5%	-11,1%	-9,3%
15	201,1	195,5	199,4	-8,6%	-11,2%	-9,4%
16	200,8	195,2	199,2	-8,7%	-11,3%	-9,5%
17	200,5	194,5	198,7	-8,9%	-11,6%	-9,7%
18	199,6	193,3	197,6	-9,3%	-12,1%	-10,2%
19	198,8	192,3	196,6	-9,6%	-12,6%	-10,6%
20	198,0	191,7	195,8	-10,0%	-12,9%	-11,0%
21	197,5	191,5	195,3	-10,2%	-13,0%	-11,2%
22	197,1	191,3	194,7	-10,4%	-13,1%	-11,5%

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23	196,9	191,1	194,3	-10,5%	-13,1%	-11,7%
24	196,8	190,9	194,2	-10,6%	-13,2%	-11,7%
25	205,4	202,2	204,9	-6,6%	-8,1%	-6,8%
26	204,0	200,7	203,3	-7,3%	-8,8%	-7,6%
27	203,0	199,6	202,2	-7,7%	-9,3%	-8,1%
28	202,8	199,3	201,6	-7,8%	-9,4%	-8,4%
29	202,7	199,2	201,4	-7,9%	-9,5%	-8,4%
30	202,8	199,3	201,1	-7,8%	-9,4%	-8,6%
31	202,1	198,7	201,5	-8,1%	-9,7%	-8,4%
32	201,1	197,7	200,9	-8,6%	-10,1%	-8,7%
33	200,6	197,3	200,5	-8,8%	-10,3%	-8,9%
34	200,2	196,9	200,2	-9,0%	-10,5%	-9,0%
35	199,5	196,5	200,0	-9,3%	-10,7%	-9,1%
36	199,1	196,3	200,0	-9,5%	-10,8%	-9,1%
37	199,0	196,3	200,0	-9,6%	-10,8%	-9,1%

II. CONCLUSION

Tension adjusts from the structures use low voltage distribution in networks long in the distance of consumers tension level up to par increase the problem solution to do enable gives low voltage electricity in networks electricity of energy quality indicators improve for enhancer from transformers use efficiency scientific and practical confirmation network organizations electricity energy voltage by GOST 13109-97 normalized from parameters deviation eliminate reach enable gives.

Low voltage electricity in networks voltage adjust of devices necessary installation the place in choosing their supply in the network tension of losses to increase effect account get need Losses from the decrease come coming out economic from efficient received funds networks reconstruction and modernization to do orientation, electric energy transmission and distribution organize to reach improvement, consumers electricity energy with provide quality and reliability to increase service to do can.

III. REFERENCES

[1] B.M. Khusanov. Village economy electricity networks energy efficiency increase modern methods // Science , innovative technique and of technologies development prospects Republic scientific and practical conference . Opposite . 2023. p. 39-42.
[2] Jezhelenko I.V. Yul Saenko. Pokaseteli kachestva elektroenergii i ix kontrol na promyshlennyx predpriyatiyax. - 3-e izd., pererab . i dop. - M: Energoatomizdat, 2000, - 252 p.
[3] Vinogradov V.V., Vinogradova A.V., Bolshev V.E. Ustroystva i sistema monitoringa nadejnosti elektrosnabzheniya i ekloneniya napryazheniya v elektricheskikh syyatakh 0.38 kV // Vestnik NGIEI. 2017. No. 11 (78). S. 69-81..
[4] Vinogradov A.V., Golikov I.O., Borodin M.V., Borodina E.V., Avtomaticheskoe regulirovanie naprajeniya na transformernoy podstantsii: sposob, algoritim i metod rascheta // Promyshlennaya energetika. – 2014. – No. 11.
[5] GOST 13109-97 "Electricity. Sovmestimost tekhniche- skikh means electromagnetic. Normy kachestva elektricheskoy energii v sistemakh elektrosnabzheniya obshchego naznacheniya».
[6] Yu.Abdullazyanov , A.R.Akhmetshin . Vybor optimalo teknicheskogo resheseniya dlya obespecheniya normativnogo urovnya napryajeniya v raspredelitelnykh setyax 0.4-10 kV // VESTNIK IrGTU №6 (53) 2011, 113-118 p.