



• Designed for creation of thermoelectric generators used as a low-temperature stage of heat engines, internal combustion engines, diesel engines, gas turbines, etc. by using the heat of exhaust gases, as well as for creation of thermal and electricity generators with catalytic flameless combustion of gas or liquid fuel. Thus, full ecological purity of generators operation is achieved.

• Designed for creation of stand-alone electric energy sources with various heat sources: industry with heat releasing processes; garbage incineration; nuclear reactors, isotopes; geothermal waters, solar energy, hot petroleum on sea drilling rigs.

• The operating principle of thermoelectric generator modules is based on direct thermal into electric energy conversion using thermoelectricity.

#### **Appearance of generator module**

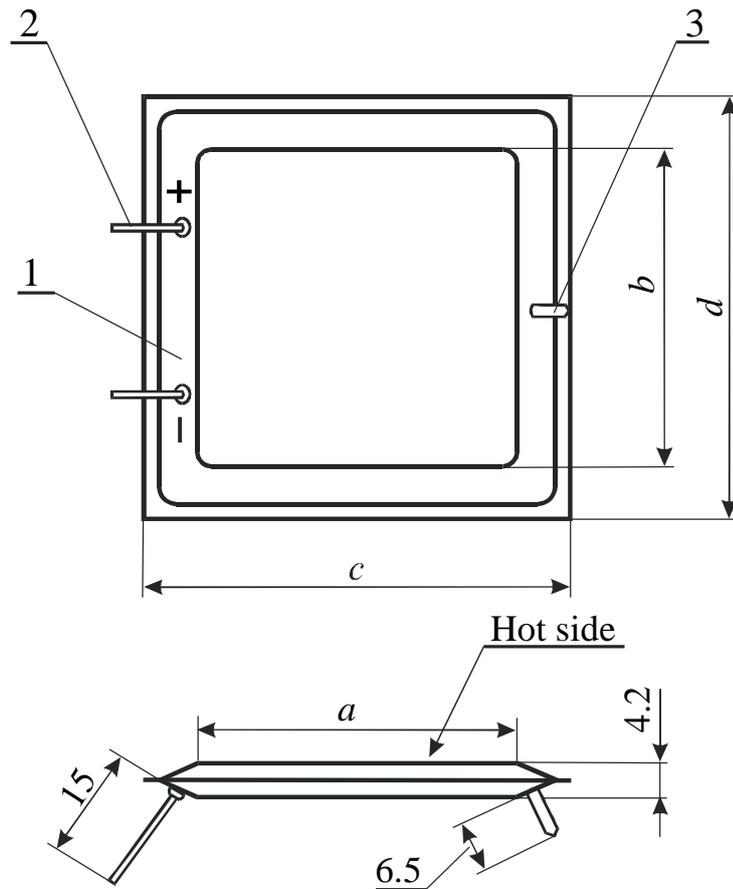


• The module consists of thermocouples connected electrically in series and thermally in parallel. The thermoelements are made of special thermoelectric materials, included functionally graded, providing their maximum efficiency over a wide temperature range.

#### **General properties of modules**

- |  |                  |
|--|------------------|
| • Hot-side operating temperature under long-term operation | 250 °C and lower |
| • Permissible overheating of hot side                      | 300 - 400 °C     |
| • Cold side operating temperature                          | 30-80°C          |
| • Permissible overheating of cold side                     | 120°C            |
| • Number of “heating-cooling” cycles                       | up to 20000      |

### Schematic diagram of generator module housing



1 - case; 2 –electric conductors;  
3 – hermetically sealed tube for filling the case with inert gas

Modules type	$a$ , mm	$b$ , mm	$c$ , mm	$d$ , mm
Altec –1010, 1011, 1016, 1017, 1018	42	42	56	56
Altec –1019÷1022	32	32	44	44
Altec –1023÷1028	32	62	48	78
Altec –1029÷1035	62	62	77	77
Altec –1036÷1039	92	92	108	108

- The modules offer enhanced reliability due to the use of latest technique for legs connection and arrangement in sealed metal cases made of stainless thin-wall steel, as well as special electric connections inside the module increasing reliability parameter MTBF by a factor of 50-2800.

- The modules are produced according to a special flexible technology making possible elaboration of their new variants without additional expenses.

### Parameters of thermoelectric modules

Modules type	Dimensions, mm	$U$ , B	$I$ , A	$W$ , W	$Q$ , B $\tau$	$\eta$ , %	$M^*$
Altec 1010	40x40x4.0	4.4±0.2	1.4±0.07	6.0±0.3	100±5	6.0±0.3	1
Altec 1011	40x40x4.0	2.2±0.1	2.75±0.15	6.0±0.3	100±5	6.0±0.3	1
Altec 1016	40x40x4.0	1.1±0.05	5.5±0.3	6.0±0.3	100±5	6.0±0.3	80
Altec 1017	40x40x4.0	0.55±0.03	11±0.5	6.0±0.3	100±5	6.0±0.3	350
Altec 1018	40x40x4.0	0.27±0.02	22±1	6.0±0.3	100±5	6.0±0.3	600
Altec 1019	30x30x4.0	0.9±0.05	3.5±0.2	3.1±0.2	50±3	6.0±0.3	1
Altec 1020	30x30x4.0	0.45±0.02	7±0.4	3.1±0.2	50±3	6.0±0.3	50
Altec 1021	30x30x4.0	0.3±0.02	10±0.6	3.0±0.2	50±3	6.0±0.3	190
Altec 1022	30x30x4.0	0.15±0.01	20±1.5	3.0±0.2	50±3	6.0±0.3	400
Altec 1023	30x60x4.0	1.8±0.1	3.5±0.2	6.3±0.3	100±5	6.0±0.3	1
Altec 1025	30x60x4.0	0.9±0.05	7±0.4	6.3±0.3	100±5	6.0±0.3	90
Altec 1026	30x60x4.0	0.6±0.03	10±0.6	6.0±0.3	100±5	6.0±0.3	270
Altec 1027	30x60x4.0	0.3±0.02	20±2	6.0±0.3	100±5	6.0±0.3	520
Altec 1028	30x60x4.0	0.15±0.01	37±3	5.5±0.3	100±5	5.5±0.3	840
Altec 1029	60x60x4.0	3.6±0.2	3.5±0.2	12.6±0.6	200±10	6.0±0.3	1
Altec 1030	60x60x4.0	1.8±0.1	7±0.4	12.6±0.6	200±10	6.0±0.3	150
Altec 1031	60x60x4.0	1.2±0.05	10±0.6	12±0.6	200±10	6.0±0.3	450
Altec 1032	60x60x4.0	0.9±0.05	13±0.7	12±0.6	200±10	6.0±0.3	580
Altec 1033	60x60x4.0	0.6±0.03	20±1.5	12±1.5	200±10	6.0±0.3	940
Altec 1034	60x60x4.0	0.3±0.02	37±3	11±0.6	200±10	5.5±0.3	1500
Altec 1035	60x60x4.0	0.15±0.01	65±5	10±0.6	200±10	5.2±0.25	2800
Altec 1036	90x90x4.0	8±0.4	3.5±0.2	28±2	460±25	6.0±0.3	1
Altec 1037	90x90x4.0	4±0.2	7±0.4	28±2	460±25	6.0±0.3	170
Altec 1038	90x90x4.0	2.7±0.2	9.5±0.5	25±2	460±25	5.4±0.3	600
Altec 1039	90x90x4.0	1.35±0.07	18±1	24±2	460±25	5.2±0.25	1140

\*M is coefficient for enhanced reliability modules showing how many times MTBF of enhanced reliability modules is greater as compared to standard reliability modules Altec-1060, 1061, 1065, 1069, 1074, 1081. The information on MTBF values is provided at the buyers' request.

**Modules Characteristics at intermediate temperatures**

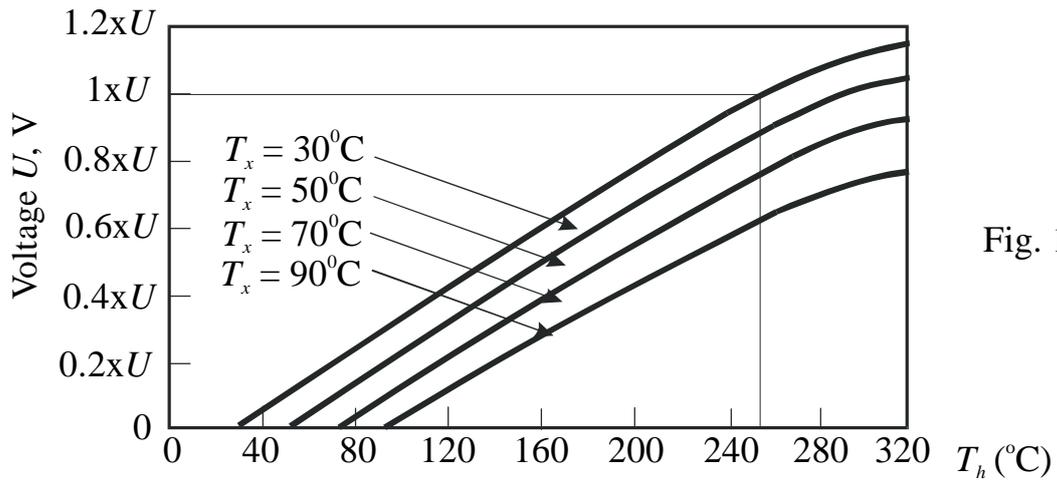


Fig. 1

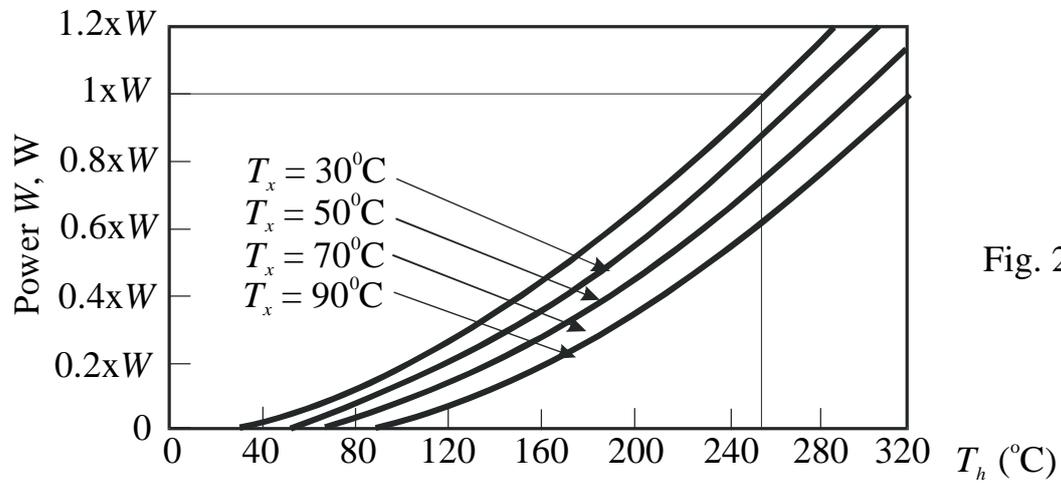


Fig. 2

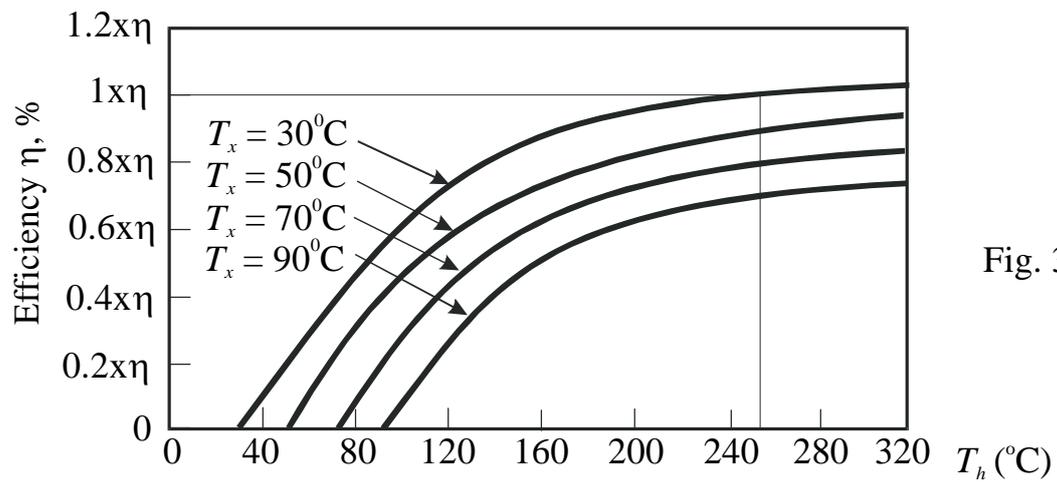


Fig. 3

**Orders and additional information:** General Post Office, Box 86, Chernivtsi, 58002, Ukraine;  
 e-mail: [ite@inst.cv.ua](mailto:ite@inst.cv.ua); fax: (380-3722)-41917; tel: (380-3722)-41917; <http://ite.cv.ukrtel.net>.