

ELO standard/rotated contact system

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1. SCOPE**1.1 Content**

This specification describes the design, the characteristics, the versions, the tests and the quality requirements of the ELO 0.63 contact system.

1.2 General Product Description

The ELO socket contact and pin contact are built as two piece flat contacts, consisting of a contact spring and an independent steel locking spring. Due to this contact construction there will be reached high stability and safety contact also on long-term loading. The locking lance, which is added on the locking lance of the contact guarantees safety positioning and engagement of the contact into the contact cavity. In spite of its miniaturized design, it fulfills all requirements for a contact system suitable for use in automobiles and covers a wide range of application sectors in waterproof and non-waterproof applications.

The electrical contact is made by a square pin with an edge length of 0.63mm.

1.3 Application Sector

The contact system ELO is designed for electronic and electrical applications in motor vehicles, where vibration and mechanical stress can, in the long-term, affect the quality of conventional contact systems.

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1.4 Product Overview

product family	ELO CRIMP-CONTACTS																			
product	socket contacts					pin contacts														
wire size	0,35-0,5		0,75		0,35-0,5		0,75													
sealing	not sealed		sealed		not sealed		sealed		not sealed											
surface	Sn	Au	Sn	Au	Sn	Au	Sn	Au	Sn	Au										
type																				
normal	1411550-1		1411550-2		1411554-1		1411554-2		1411551-1		1411551-2				1411580-1		1411580-2			
rotated	1411566-1		1411566-2						1411567-1		1411567-2									
norm. + short circuit	1411558-1		1411558-2																	
rotated + short circuit	1411574-1		1411574-2						1411575-1		1411575-2									
normal	1411552-1		1411552-2		1411556-1		1411556-2		1411553-1		1411553-2				1411582-2					
rotated					1411572/78-1		1411572/78-2						1411573-1		1411573-2					
norm. + short circuit	1411560-1		1411560-2						1411561-1		1411561-2									
rotated + short circuit	1411576-1																			
Applicator	MQC-F	9-054100-X		9-0541102-X		9-541101-X		9-0541103-X		9-0541100-X										
	HDI	1528284-X				1528290-X				1528284-X										
crimp hand tool		5-1393462-3		5-1393462-4		5-1393462-2		5-1393462-5		5-1393462-3										

Crimp Optimisation variants fulfill the „Slow motion bending“ test according LV-214-2

Socket Contact Wire size 0,35-0,5 mm² not sealed
Pin Contact Wire size 0,35-0,5 mm² not sealed

7-1411550-1, 5-1411558-2, 5-1411558-4
5-1411580-1, 5-1411580-2

Notes:

- 4 : contact area is greased with Nyogel 760G
Extraction tool 3-1579007-9; minimal pitch (mm) 2.54x2.54 normal application and 4.0x3.5 sealed application

Description	PN	Wire size FLR (mm ²)
Single-Wire seal	0-1393457-2	0.35-0.5
Single-Wire seal	0-1393457-1	0.5-0.75
Sealing plug	0-1393457-3	

Diagram 1: Sealings

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2. APPLICABLE DOCUMENTS

The following documents form a part of this specification to the extent specified herein. In the case of a conflict between this specification and the specified documents, this specification has priority. For the listed documents is valid the specification 108-94155 at its first date of release with the Revision A.

2.1 TE Specifications

- A. 114-18022 General guidelines for the application of contacts with open crimp barrels
- B. 114-18432 Application specification for ELO seal crimp contacts
- C. 114-18433 Application specification for ELO crimp contacts
- D. 114-18882 Connection drawing for ELO, ELO Power 2.8/5.2, contact pin

2.2 TE Drawings

See section 1.4

2.3 Other Standards

- A. DIN/IEC 512 Measuring methods and testing procedures for electromechanical components
- B. DIN 41 640 Measuring methods and testing procedures for electromechanical components
- C. DIN 40 046 Environmental testing procedure for electrical engineering
- D. DIN IEC 352 Part 2: Solder less electrical connections
- E. DIN/IEC 68 Basic environmental testing procedures

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3. DESCRIPTION**3.1 Contact construction**

All missing data's of design and construction, such as dimensions, materials, wire sizes, etc., are shown in the product drawings.

3.1.1 ELO pin contact (see figure 1)

The contact pin consists of a stamped and formed contact body, which leading part exhibits a dimension of 0.63mm including the pin. The spring made from steel is assembled on the pin body. The locking lance on the spring is used to lock the contact in the cavity. The locking spring has furthermore a polarization lance. This polarization lance assists to an orientated connecting of the contact in the contact cavity.

3.1.2 ELO socket contact standard (see figure 2)

The contact socket consists of a stamped and formed contact body which owns two oppositely contact points in the virtual contact width. Both are definitely separated by an element of distance. The locking spring of the contact socket and the contact pin are almost identical. Concerning tin-plated contact socket, formed supporting tongue attend to reach contact force.

3.1.3 ELO socket contact rotated (see figure 3)

The contact points are rotated 90° to the standard type. The design characteristic corresponds to the standard type largely.

3.1.4 Polarization versions (see figure 4)

Beneath the concentric polarization, which is situated at the back of the locking spring, there is another side variation which is visible at the beginning of the locking spring. Only the compatible housings can be load by each contact.

3.1.5 Short circuit indent (see figure 2)

Optionally some contact sockets endue a function of short circuit. This option is signalized by an elevation, which is located between the socket body and the wire crimp. This gold-plated elevation assists for contacting with a short circuit spring.

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3.2 Materials

- A. Basic material: - wrought copper alloy, according TE specification
- B. contact plating: - tin plating
- gold over nickel in the contact area, other parts tin
- C. locking spring: - stainless steel

4. REQUIREMENTS

4.1 General Requirements

All tests executed with the individual components must comply with the inspection plan in this specification.

- The specified tools must be used for the mechanical tests.
- The samples must be free of visible damage.
- The samples must comply with the current drawings.
- Only parts from series production are to be used for testing.
- The wires used must possess waterproof insulation, be sufficiently resistant to deformation under heat, and be free of damage, holes and grooves.
- Movement rate for mechanical tests: 25mm/min.
- The contact parts must be applied with tools from TE.
- Application of the contacts to Spec. 114-18432 or 114-18433.

4.2 Performance data

Current carrying capacity	Max. 7.5 A
Maximum mating cycles	20 for tin-plated contacts 100 for gold-plated contacts
Temperature range	-40°C to +120°C for tin-plated contacts -40°C to +150°C for gold-plated contacts

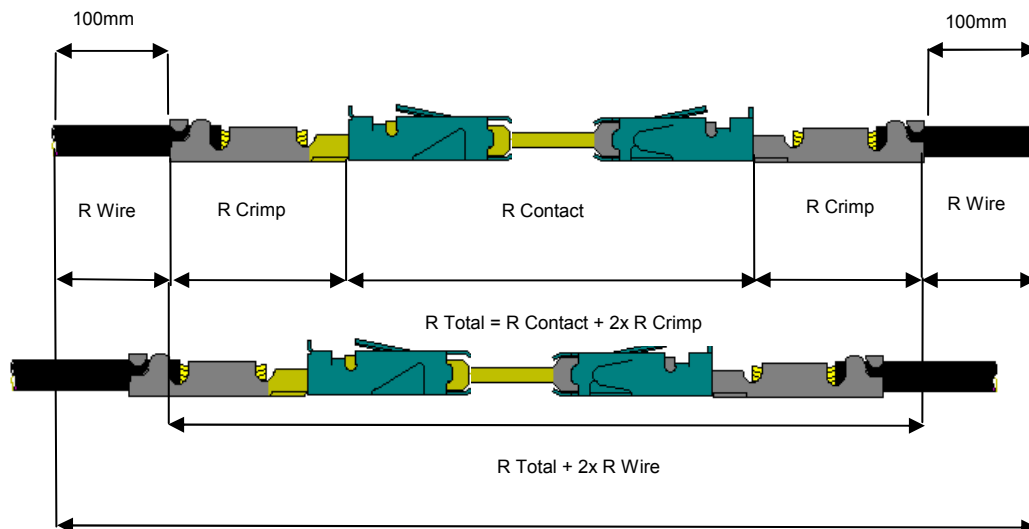
ELO standard/rotated contact system

4.3 Electrical Properties

TEST DESCRIPTION	REQUIREMENTS	PROCEDURE
Contact resistance	$R_K < 10 \text{ m}\Omega$	Conditions of test: No-load voltage < 20 mV Test current < 100mA Measure the contact resistance in new condition in accordance with IEC 512-2 / DIN 41640 Part 4 subtract the wire resistance (test equipment: see section 4.3.1)
Maximum current carrying capacity for crimp contact, "in free air"	Max. 7.5 A	Contact in free air, wire range 0.75mm ² at room temperature. Measure in accordance with IEC 512-3 / DIN 41 640 P.3
Current carrying capacity "contacts in housing" (derating)	Max. 7.5 A The values may vary, depending on the application and version; see the examples in the specification. If no comparable examples exist, the user must test each individual case (or have it tested).	Contacts engaged in housing cavities Measure in accordance with IEC 512-3 / DIN 41 640 P.3

4.3.1 Test Equipment for Current Heating and Contact Resistance

Crimp Connection



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4.4 Mechanical Properties

TEST DESCRIPTION	REQUIREMENTS	PROCEDURE								
Mating and unmating forces	<p>The following values apply to the first mating cycle:</p> <p>Mating force $\leq 3,5$ Sn $\leq 2,0$ Au</p> <p>Unmating force $\leq 3,5$ Sn $\leq 2,0$ Au</p>	Mating and unmating force per contact pair (pin and socket), measured in the housing, all wire ranges, DIN 41 640 P.36								
Crimp extraction forces	<table border="0"> <tr> <td>Force:</td> <td>Wire size (mm²)</td> </tr> <tr> <td>≥ 52N</td> <td>0,35</td> </tr> <tr> <td>≥ 74N</td> <td>0,5</td> </tr> <tr> <td>≥ 100N</td> <td>0,75</td> </tr> </table>	Force:	Wire size (mm ²)	≥ 52 N	0,35	≥ 74 N	0,5	≥ 100 N	0,75	DIN IEC 352 P.3
Force:	Wire size (mm ²)									
≥ 52 N	0,35									
≥ 74 N	0,5									
≥ 100 N	0,75									
Contact retention force in standard steel cavity	<p>Extraction force of first contact retention $F \geq 60$ N</p> <p>Extraction force of second contact retention $F \geq 60$ N</p>	(Contact retention force in housing: see housing-specific product specification)								
Retention force of cantilever spring on contact body	$F \geq 70$ N									

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4.5 Environmentals

TEST DESCRIPTION	REQUIREMENTS	PROCEDURE
Electrical stress test	After the entire test, the total resistance (contact + crimp resistance) increases by not more than 200% of the original value.	Test conditions and procedure see section 4.6.1 Temperature: -40°C to +80°C, cycle duration 6h Current during warm phase: see the derating curves at 80°C ambient temperature.
Salt fog in changing climates	After the entire test, the contact resistance increases by not more than: 200% of the original value for gold-plated contacts; 300% of the original value for tin-plated contacts.	Test conditions Test in mated state. Procedure See section 4.6.1 or 4.6.2.
Dynamical mechanical load	The contact resistance increases by not more than 200% of the original value. There is no mechanical damage. Maximum discontinuity duration: $t \leq 1 \mu s$	Monitor for discontinuities during the entire test duration. Test in mated state. Procedure: see section 4.6.1 or 4.6.2. Test in accordance with DIN IEC 68 P.2-6
Environmental simulation	After the entire test, the contact resistance in the mated condition increases by not more than: 200% of the original value for gold-plated contacts; 350% for tin-plated contacts. With the rated current applied for 15 minutes, the current heating may not be more than 20°K higher than in the new condition.	Test conditions Test in mated state. Procedure See section 4.6.1 or 4.6.2.

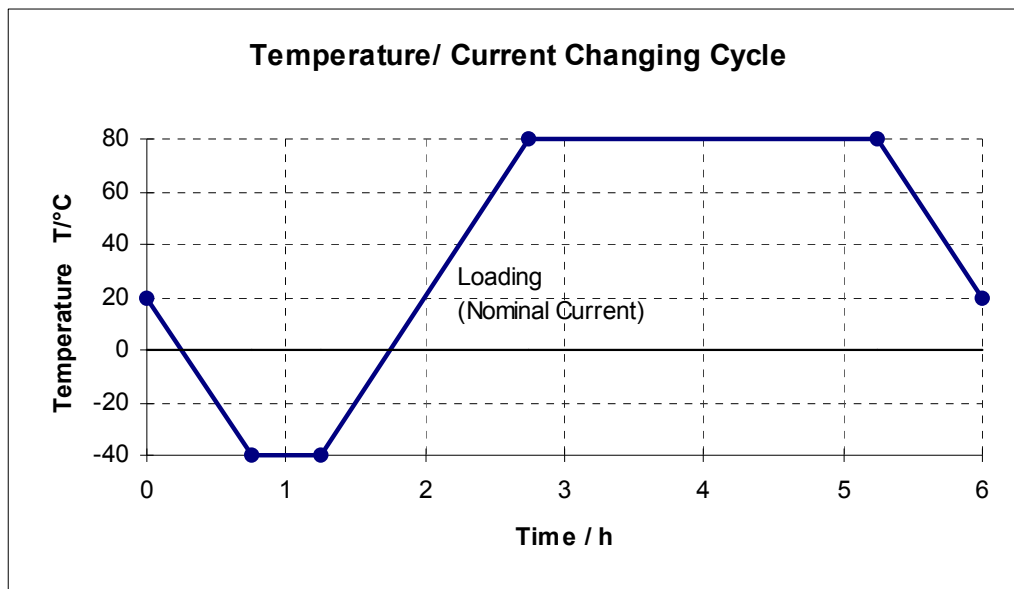


Diagram 2: Temperature/ Current Changing Cycle

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4.5.1 Procedure for Tin-Plated, Gold-Plated Contacts

Test or Examination	Test Sequence			
	Test Group: Electrical Stress	Test Group: Dynamic Requirement	Test Group: Salt fog in changing climate	Test Group: Environmental simulation
Visual inspection	1.	1. 6.	1. 5.	1. 7. 12. 16
Contact resistance to IEC 512-2 DIN 41 640 P.4	2. 6.	2. 5.	2. 4.	2. 5. 9. 6. 11. 15.
Thermal shock to IEC 68 P.2-14 Na Duration: 144 cycles / temp.: -40 to +100°C per 15 min.h				3.
Temperature cycling to IEC 68 P.2-14 Nb Duration: 20 cycles / temp.: -40 to +100°C per 3h				4.
Continual shocks to IEC 68 T. 2-27 A= 30g / t=6 ms Total number of shocks: 50 per axis				14.
Salt fog in changing climates to IEC 68 P. 2-52 Severity: 1 / duration: 1 cycle			3.	
Industrial mixed flowing gas (0.2 ppm SO ₂ , 0.01 ppm H ₂ S, 0.2 ppm NO ₂ , 0.01 ppm Cl ₂ / 25°C / 75% / 21 d) Flow rate 1 m ³ /h				8.
Moist heat cycling to IEC 68 P.2-30 Duration: 21 days / upper limit temperature +55°C	4.			
Moist heat cycling to IEC 68 P.2-30 Duration: 10 days / upper limit temp. +55°C				10.
Storage in dry heat to IEC 68 P.2-2 Bb Duration: 120h / temperature: +120°C				5.
Vibration test f: 15 to 500 Hz/ a = 8g Duration: 25 frequency cycles per spatial axis Sweep rate: 1 octave per minute		3.		
Vibration test f: 15 to 1000 Hz/ a = 10g Duration: 6h per spatial axis, Sweep rate: 1 octave per minute				13.
Continual shocks, a = 30g / t = 6 ms Total number of shocks: 6, 000, tin-plated 6,000, gold-plated		4.		
Temperature/current changing test 30 test cycles (1 test cycle: -40°C to +80°C, 6h), tin-plated 60 test cycles (1 test cycle: -40°C to +80°C, 6h), gold-plated	3. 5.			

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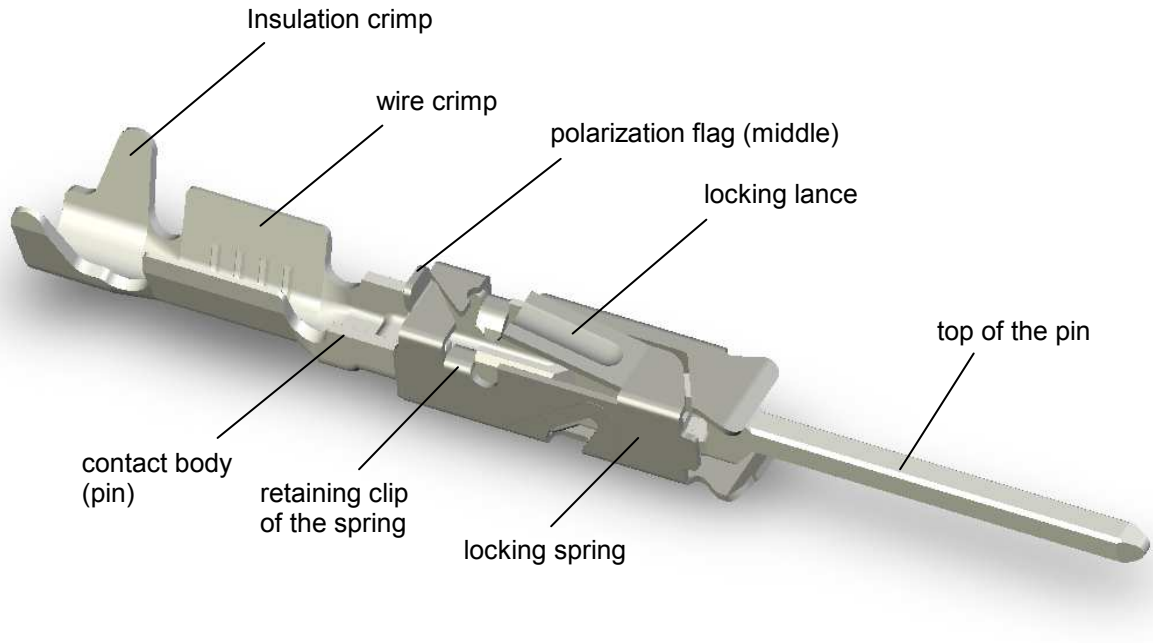


Figure 1: construction ELO 0.63 pin contact

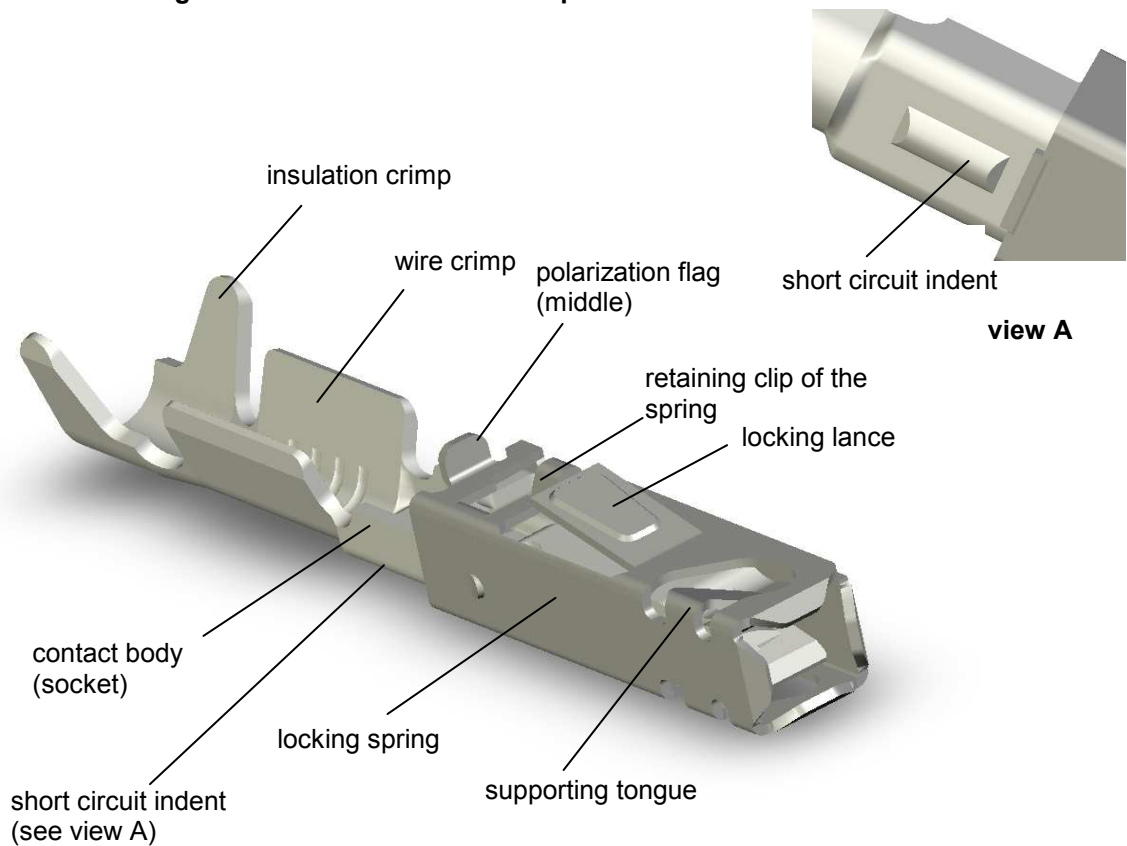


Figure 2: construction ELO 0.63 socket contact

ELO standard/rotated contact system

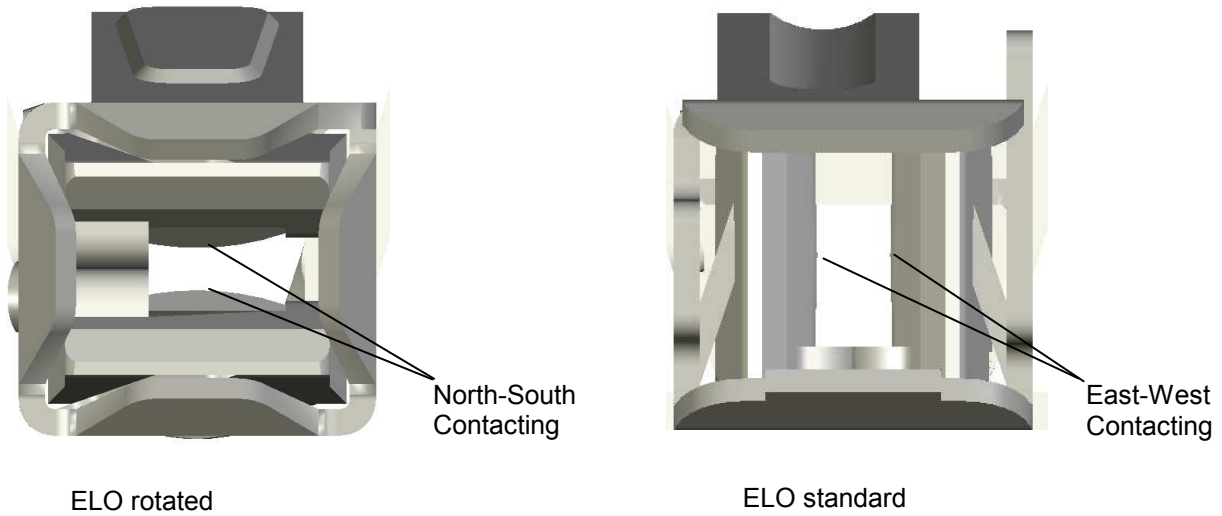


Figure 3: ELO socket contact rotated/standard

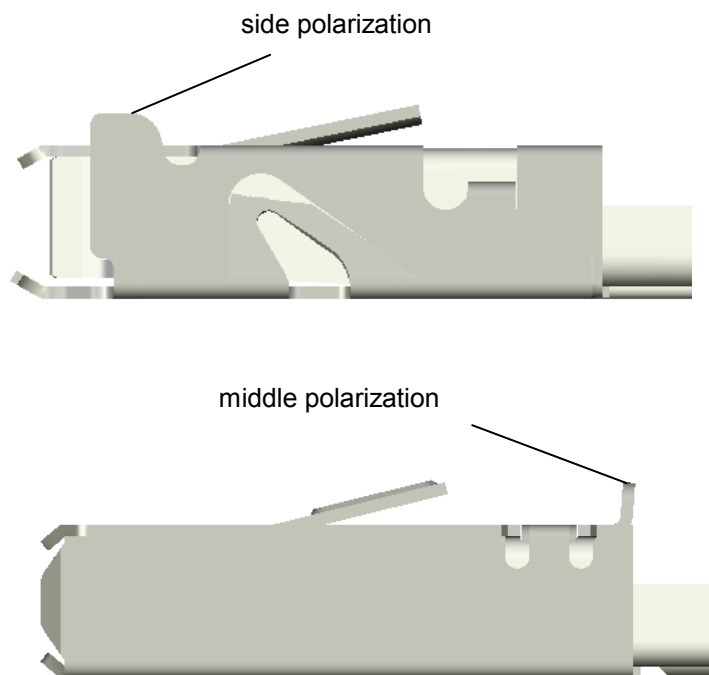


Figure 4: polarization

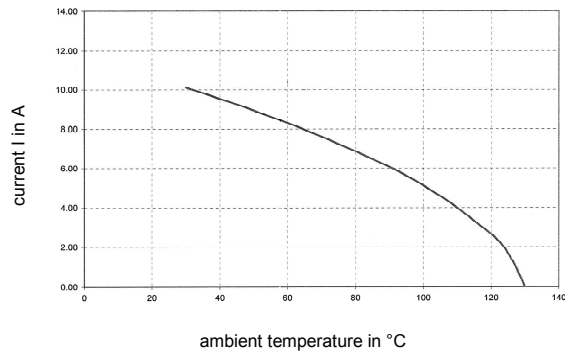
ELO standard/rotated contact system

4.6 Derating-curves

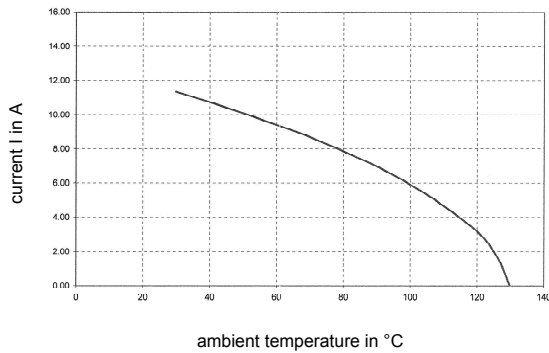
4.6.1 ELO standard, Tin-Plated, Gold-Plated

ELO standard, Tin-Plated, free in air

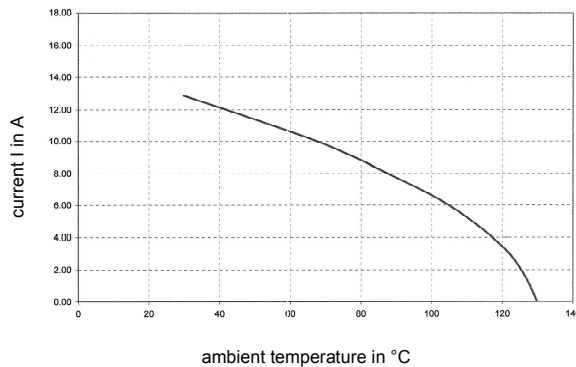
**Derating ELO standard, wire size 0.35mm²,
Sn, loose piece in free air**



**Derating ELO standard, wire size 0.50mm², Sn,
loose piece free in air**



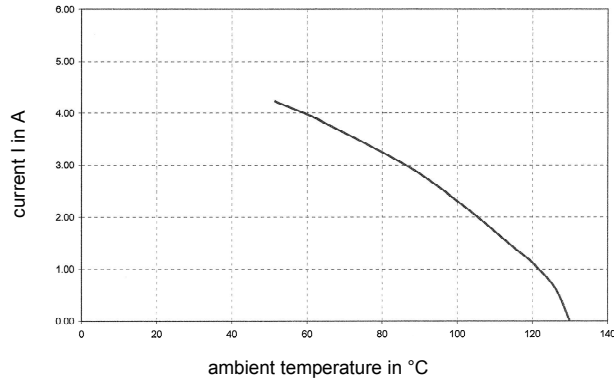
**Derating ELO standard, wire size 0.75mm²,
Sn, loose piece in free air**



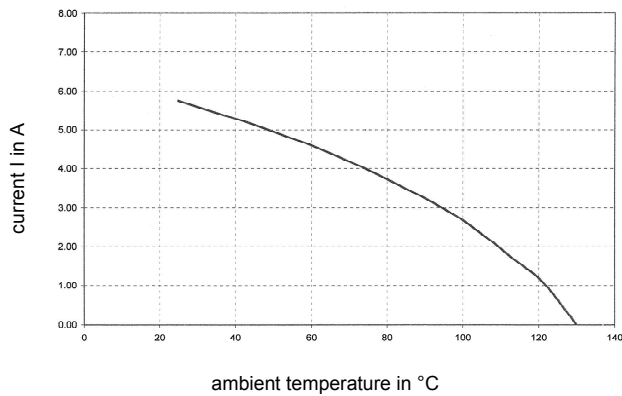
ELO standard/rotated contact system

ELO standard, Tin-Plated, full loaded

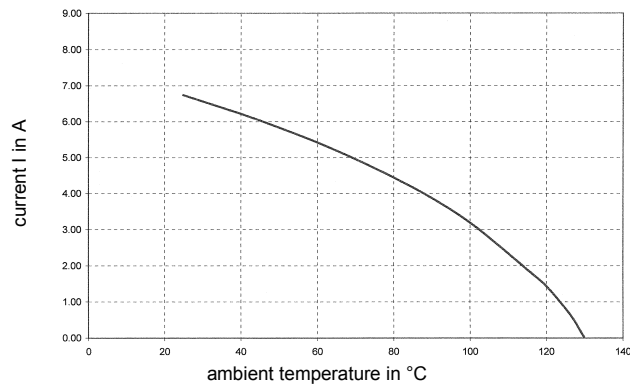
**Derating ELO standard, wire size 0.35mm², Sn
(in 26-way connector)**



**Derating ELO standard, wire size 0.50mm², Sn
(in 26-way connector)**



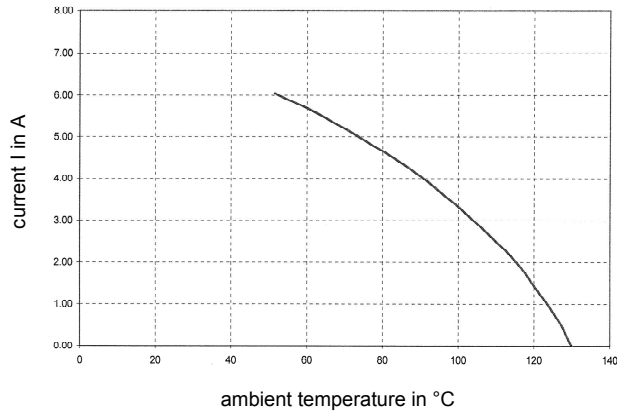
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(in 26-way connector)**



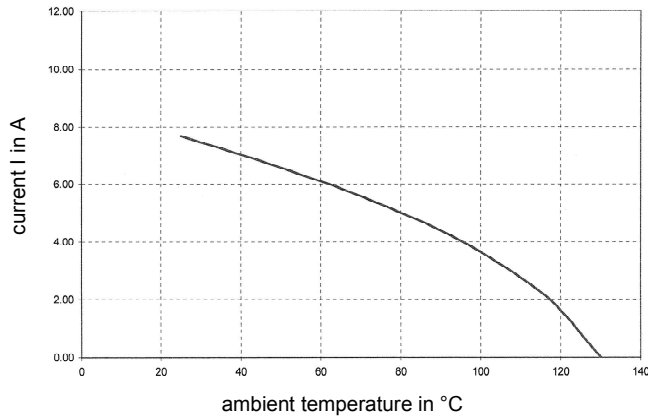
ELO standard/rotated contact system

ELO standard, Tin-Plated, 1/3 filled

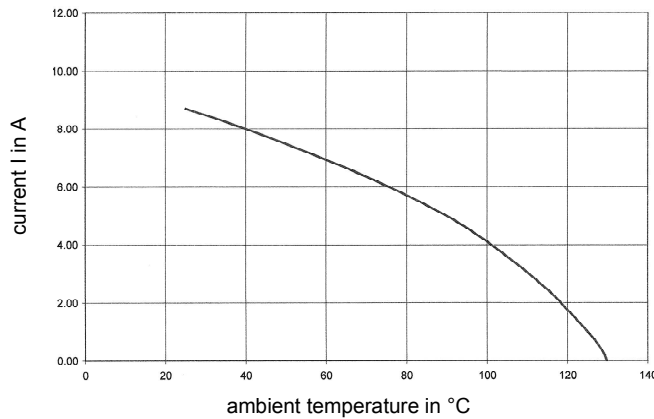
**Derating ELO standard, wire size 0.35mm², Sn
(in 1/3 filled 26-way connector)**



**Derating ELO standard, wire size 0.50mm², Sn
(in 1/3 filled in 26-way connector)**



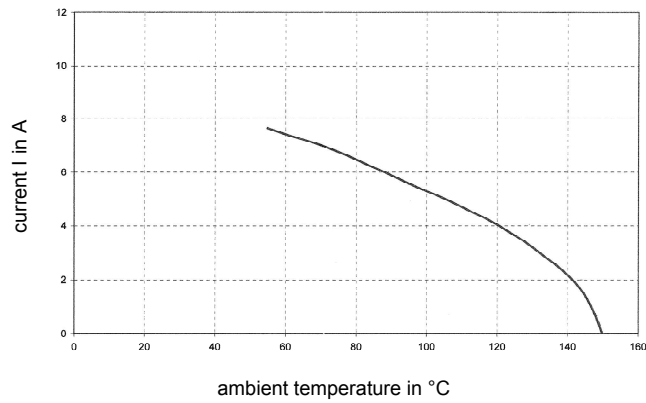
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(in 1/3 filled 26-way connector)**



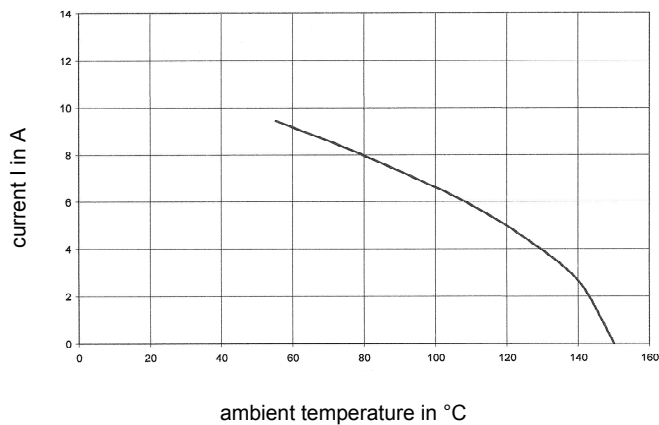
ELO standard/rotated contact system

ELO standard, Gold-Plated, free in air

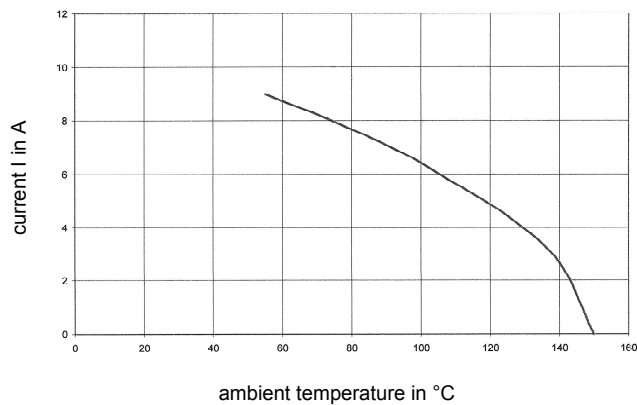
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loose piece in free air**



**Derating ELO standard, wire size 0.50 mm², Au,
loose piece in free air**



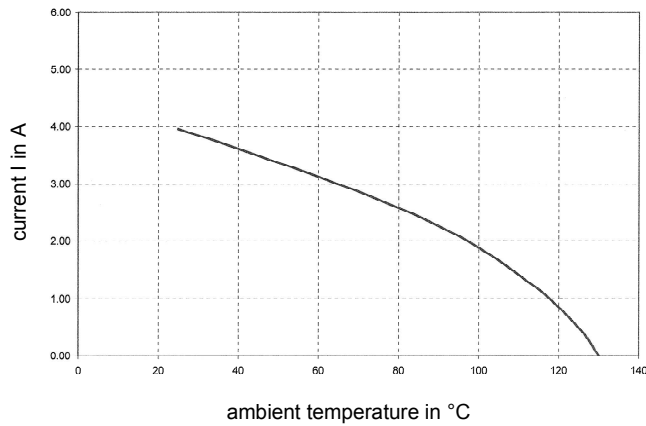
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loose piece in free air**



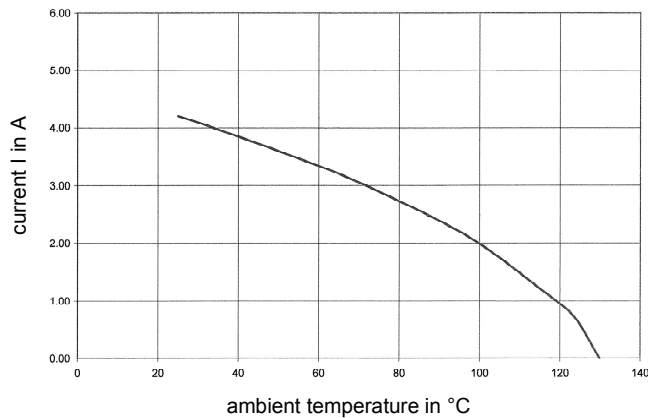
ELO standard/rotated contact system

ELO standard, Gold-Plated, full loaded

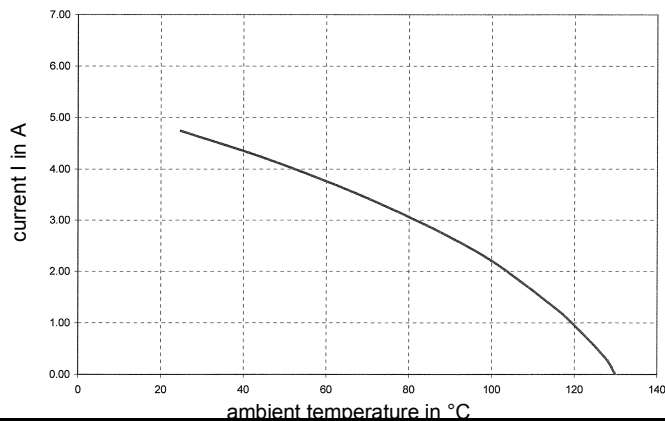
**Derating ELO standard, wire size 0.35mm², Au
(in 50-way connector)**



**Derating ELO standard, wire size 0.50mm², Au
(in 50-way connector)**



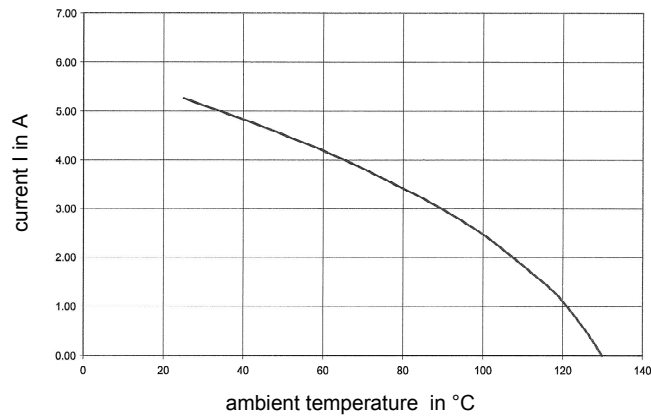
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(in 50-way connector)**



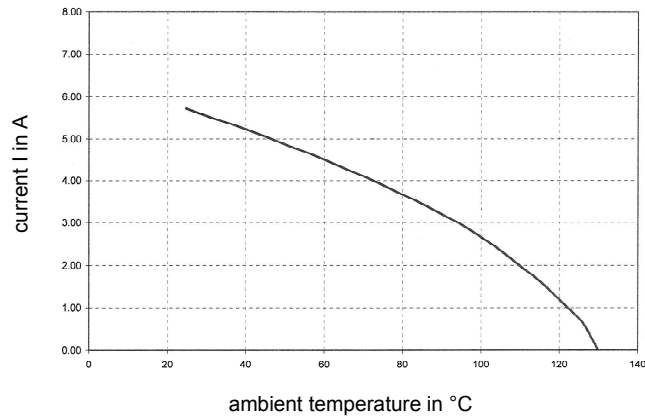
ELO standard/rotated contact system

ELO standard, Gold-Plated, 1/3 filled

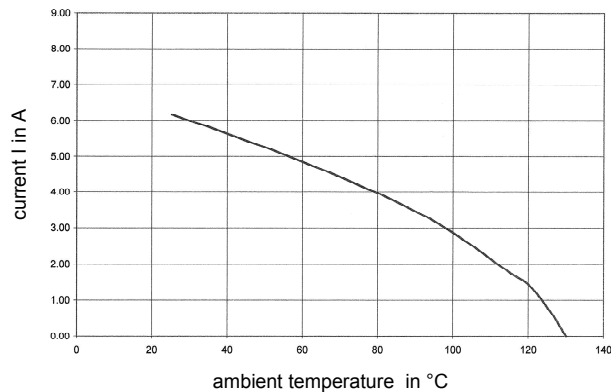
**Derating ELO standard, wire size 0.35mm², Au
(in 1/3 filled 50-way connector)**



**Derating ELO standard, wire size 0.50mm², Au
(in 1/3 filled 50-way connector)**



**Derating ELO standard, wire size 0.75mm², Au
(in 1/3 filled in 50-way connector)**

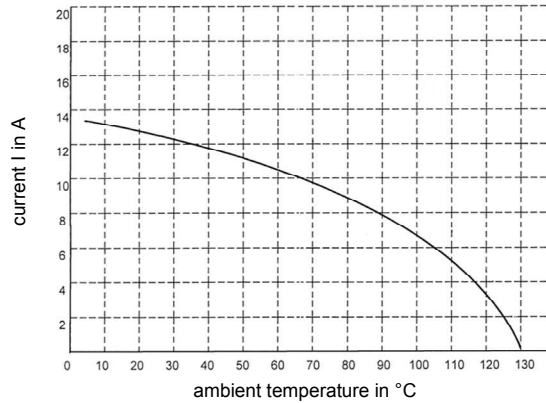


ELO standard/rotated contact system

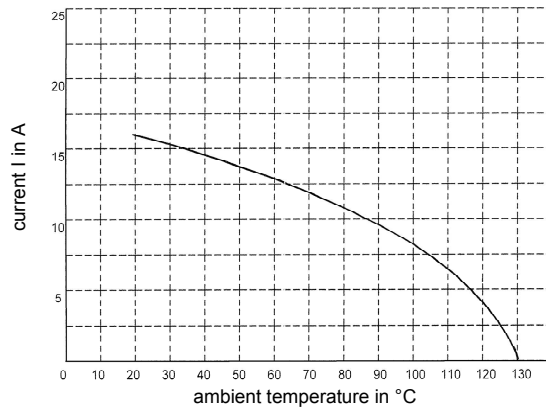
4.6.2 ELO rotated, Tin-Plated, Gold-Plated

ELO rotated, Tin-Plated, free in air

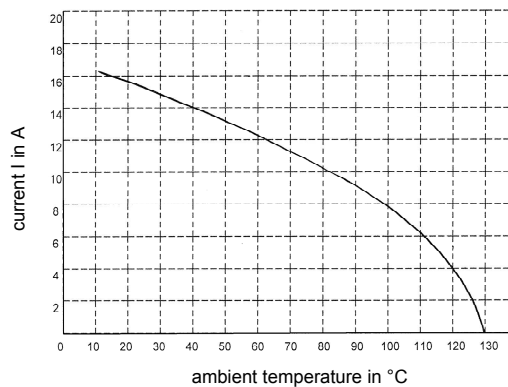
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loose contact in free air**



**Derating ELO rotated, wire size 0.5mm², Sn,
loose piece in free air**



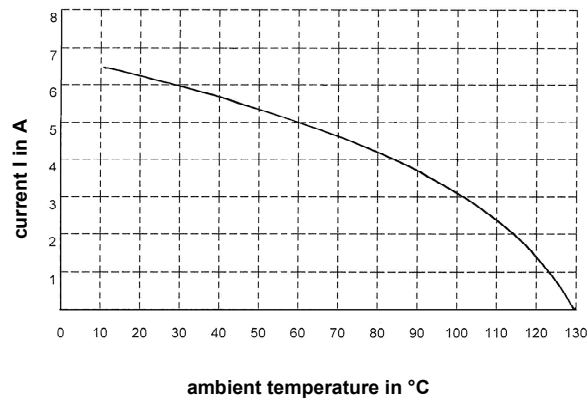
**Derating ELO rotated, wire size 0.75mm², Sn,
loose piece in free air**



ELO standard/rotated contact system

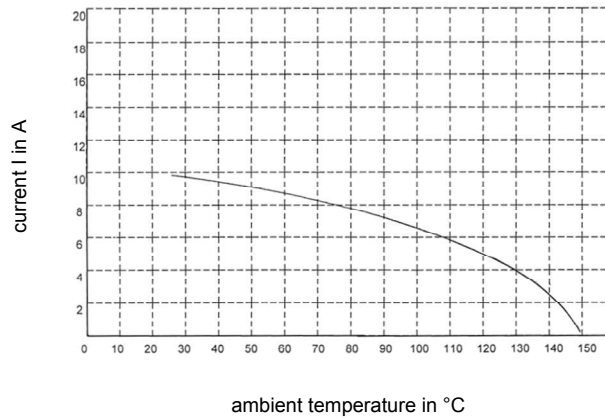
ELO rotated, Tin-Plated, 48 contacts filled in LSZ connector

**Derating ELO rotated, wire size 0.5mm², Sn,
48 contacts filled in LSZ- connector**

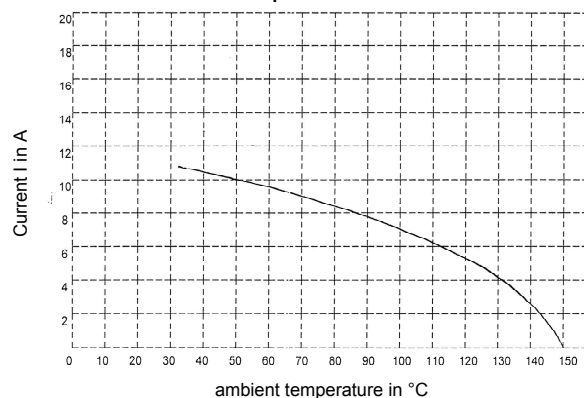


ELO rotated, Gold-Plated, free in air

**Derating ELO rotated, wire size 0.5mm², Au,
loose piece in free air**



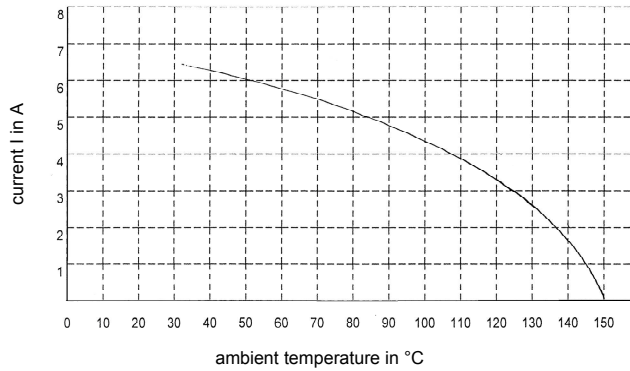
**Derating ELO rotated, wire size 0.75mm², Au,
loose piece in free air**



ELO standard/rotated contact system

ELO rotated, Gold-Plated, full loaded

**Derating ELO rotated, wire size 0.5mm², Au
(in 50-way connector)**



**Derating ELO rotated, wire size 0.35mm², Au
(in 3-way connector)**

