autoVimation

building machine vision

Operating manual

controlled electric heating plate

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autoVimation
machine vision construction kit

Content

1. Safety

This chapter provides important information about the safe operation of your autoVimation GmbH heating plates and the use of these instructions.

Intended usage of heating plates

Electric heating plates are suitable for heating tools, units, fittings, moulding presses and tables within the approved nominal values. Cut outs and fixing are adapted to the technical specifications and never allowed to modify.

Non-intended usage of heating hoses

All usage outside the scope of those described are non-intended usage and may be hazardous and/or lead to consequential damage.

Operator

Installation, electrical connection, commissioning, operating and maintenance of the heating plates may only be performed by trained professionals who have been authorised or instructed for these activities by the operating authority.

Safety-relevant notices

Safety notices in this guide are marked by symbols. These notices are placed immediately before the procedure step to which they apply and must be followed precisely in order to avoid hazardous situations for persons and property damage to objects.

The following pictograms are used to call attention to notices:

Attention ! is used to call attention to potential health hazards or lethal situations.

Note ! is used for notices which, if disregarded, could result in failures during operational processes.

Tip ! is used to provide advice or additional information.

Liability exclusion

We herewith expressly serve notice that autoVimation GmbH is not liable for any damage resulting from incorrect or negligent operation, maintenance or non-intended usage. This also applies to device modifications, attachments and conversions which could be detrimental to safety. In these cases the manufacturer's warranty is voided.

autoVimation GmbH accepts no product liability and warranty claims whatsoever if the Operating Instructions are not observed or are incorrectly interpreted. Nevertheless, should any difficulties arise during commissioning, we request you not to undertake any inadmissible manipulations on the device. You could compromise your warranty claim. In case of queries, please contact us sales@autovimation.com.

2. General

Unpacking and inspecting

The product must be inspected for possible shipping damage when it is unpacked. If damage is found then the freight carrier, railway company or postal authority is to be notified so that a damage report can be initiated.

Standards and regulations

This product complies with the following national and European regulations:

The "Electromagnetic compatibility" directive (89/336/EEC and 93/68/EEC)
The "Low voltage equipment" directive (73/23/EEC and 93/68/EEC)

3. Safety precautions

The recognised codes of practice and all relevant provisions in the countries of use must be observed at all times (VDE, SEV, ÖVE,..., accident prevention regulations). **The specified operating voltage must not be exceeded.** Check before initial use whether the rating data for the heating element agree with your specifications and the prevailing conditions.

Adequate electric shock protection must be ensured, e.g. by covering with perforated metal plates and protective earthing. If metal parts are heated, these must also be taken into consideration in the protective measures implemented. Heating elements, which have been modified for special applications and e.g. have special connectors or connection leads, may only be used for this specified application. Other applications have to be agreed upon with our specialists.

The temperature measured on the heating plate must not exceed the specified operating temperature at any point. Please note that excessive temperatures may also arise due to external heating.

The heating plate must fit evenly and tightly at all points of the heating surface. Unevenness or indentations must be levelled out or bridged with thermally conductive materials (heating elements, thermally conducting paste, heat conducting plate etc.). Covers and thermal insulation must be fitted such that they do not cause any accumulation of heat, which could lead to the rated limit temperature being exceeded.

Heating elements with a power output exceeding 0.6 W/cm² have to be equipped with a controller/limiter. The temperature measurement sensors must be fitted at the hottest point (determined by experiment, if necessary). Please also observe the applicable rules and regulations for temperature control/monitoring.

Temperature controllers/limiters must be matched for operation with our heating elements. Our temperature controllers are specially developed for this purpose and can be set for your special application, if required. We cannot guarantee the correct function of our heating systems if used with third party equipment.

4. Disposal

Packaging

Materials used to package the device for transport are to be disposed of in an environmentally-friendly manner by giving them to the appropriate local disposal facilities.

Device components

Defective components are to be collected and disposed according to applicable regulations. The same applies to the device itself.

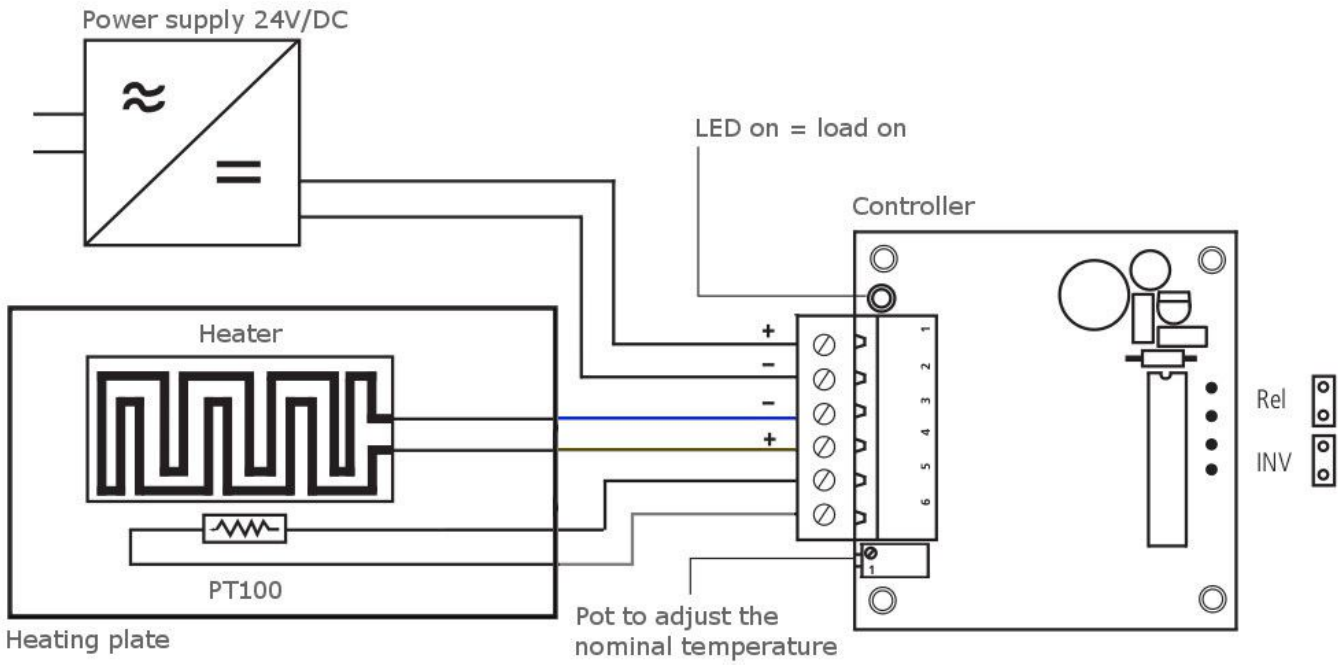
5. Pin configuration

Connector on heating plate (M12 A-coded, female)

Cable connector (M12 A-coded male)

Pin	Function
1	GND
2	+24V/DC
3	R+ PT100
4	R- PT100

Several heating plates can be connected to the heating plate controller! For more than one heating plate a terminal breakout using e.g. a socket terminal strip is required. The permissible total power of the controller must not be exceeded. This is an economical solution, if more than one heating plate is used. However, since only one PT100 temperature sensor can be connected to the controller, using several heating plates only works, if all camera enclosures are used with the same ambient temperature!



Pin	Color	Function
1	-	+24V/DC power supply
2	-	GND power supply
3	blue	GND heating plate
4	brown	+24V/DC heating plate
5	black	PT100
6	grey	PT100

6. Adjusting the nominal temperature

Setting the nominal temperature by using a commercially available resistor (with small tolerance) or a quality-Potentiometer. There we call it simulation resistor. If you want to set the nominal temperature of e.g. 0°C, the connection for the Pt100 sensor is a simulation resistor with 100Ω. With active power supply aturn the Pot on the circuit board, until the LED starts to light up. Remove the simulation resistor and connect the Pt100 of the heating plate. The regulator now switches to 0°C. If another nominal temperature is the required use the resistance value shown in the temperature/resistor table for Pt100 sensor.

7. Temperature/resistor table for Pt100 (20°C factory preset, TCR = 0.00385 Ω/Ω/°C)

T (°C)	R (Ω)	T (°C)	R (Ω)	T (°C)	R (Ω)	T (°C)	R (Ω)	T (°C)	R (Ω)	T (°C)	R (Ω)
-50.0	80.307	-8.0	96.870	34.0	113.220	76.0	129.366	118.0	145.307	160.0	161.043
-49.0	80.704	-7.0	97.262	35.0	113.607	77.0	129.748	119.0	145.684	161.0	161.415
-48.0	81.101	-6.0	97.653	36.0	113.994	78.0	130.129	120.0	146.061	162.0	161.787
-47.0	81.498	-5.0	98.045	37.0	114.380	79.0	130.511	121.0	146.437	163.0	162.159
-46.0	81.894	-4.0	98.436	38.0	114.767	80.0	130.893	122.0	146.814	164.0	162.531
-45.0	82.291	-3.0	98.827	39.0	115.153	81.0	131.274	123.0	147.191	165.0	162.902
-44.0	82.687	-2.0	99.218	40.0	115.539	82.0	131.655	124.0	147.567	166.0	163.274
-43.0	83.083	-1.0	99.609	41.0	115.925	83.0	132.037	125.0	147.943	167.0	163.646
-42.0	83.480	0.0	100.000	42.0	116.311	84.0	132.418	126.0	148.320	168.0	164.017
-41.0	83.876	1.0	100.391	43.0	116.697	85.0	132.799	127.0	148.696	169.0	164.388
-40.0	84.271	2.0	100.781	44.0	117.083	86.0	133.180	128.0	149.072	170.0	164.759
-39.0	84.667	3.0	101.172	45.0	117.469	87.0	133.560	129.0	149.448	171.0	165.130
-38.0	85.063	4.0	101.562	46.0	117.854	88.0	133.941	130.0	149.823	172.0	165.501
-37.0	85.458	5.0	101.953	47.0	118.239	89.0	134.322	131.0	150.199	173.0	165.872
-36.0	85.853	6.0	102.343	48.0	118.625	90.0	134.702	132.0	150.575	174.0	166.243
-35.0	86.248	7.0	102.733	49.0	119.010	91.0	135.082	133.0	150.950	175.0	166.613
-34.0	86.643	8.0	103.123	50.0	119.395	92.0	135.463	134.0	151.325	176.0	166.984
-33.0	87.038	9.0	103.513	51.0	119.780	93.0	135.843	135.0	151.701	177.0	167.354
-32.0	87.433	10.0	103.902	52.0	120.165	94.0	136.223	136.0	152.076	178.0	167.724
-31.0	87.828	11.0	104.292	53.0	120.549	95.0	136.602	137.0	152.451	179.0	168.094
-30.0	88.222	12.0	104.681	54.0	120.934	96.0	136.982	138.0	152.825	180.0	168.464
-29.0	88.617	13.0	105.071	55.0	121.318	97.0	137.362	139.0	153.200	181.0	168.834
-28.0	89.011	14.0	105.460	56.0	121.703	98.0	137.741	140.0	153.575	182.0	169.204
-27.0	89.405	15.0	105.849	57.0	122.087	99.0	138.121	141.0	153.949	183.0	169.573
-26.0	89.799	16.0	106.238	58.0	122.471	100.0	138.500	142.0	154.324	184.0	169.943
-25.0	90.193	17.0	106.627	59.0	122.855	101.0	138.879	143.0	154.698	185.0	170.312
-24.0	90.587	18.0	107.016	60.0	123.239	102.0	139.258	144.0	155.072	186.0	170.682
-23.0	90.980	19.0	107.404	61.0	123.623	103.0	139.637	145.0	155.446	187.0	171.051
-22.0	91.374	20.0	107.793	62.0	124.007	104.0	140.016	146.0	155.820	188.0	171.420
-21.0	91.767	21.0	108.181	63.0	124.390	105.0	140.394	147.0	156.194	189.0	171.789
-20.0	92.160	22.0	108.570	64.0	124.774	106.0	140.773	148.0	156.568	190.0	172.158
-19.0	92.554	23.0	108.958	65.0	125.157	107.0	141.151	149.0	156.941	191.0	172.526
-18.0	92.947	24.0	109.346	66.0	125.540	108.0	141.530	150.0	157.315	192.0	172.895
-17.0	93.339	25.0	109.734	67.0	125.923	109.0	141.908	151.0	157.688	193.0	173.263
-16.0	93.732	26.0	110.122	68.0	126.306	110.0	142.286	152.0	158.061	194.0	173.632
-15.0	94.125	27.0	110.509	69.0	126.689	111.0	142.664	153.0	158.434	195.0	174.000
-14.0	94.517	28.0	110.897	70.0	127.072	112.0	143.042	154.0	158.807	196.0	174.368
-13.0	94.910	29.0	111.284	71.0	127.454	113.0	143.420	155.0	159.180	197.0	174.736
-12.0	95.302	30.0	111.672	72.0	127.837	114.0	143.797	156.0	159.553	198.0	175.104
-11.0	95.694	31.0	112.059	73.0	128.219	115.0	144.175	157.0	159.925	199.0	175.472
-10.0	96.086	32.0	112.446	74.0	128.601	116.0	144.552	158.0	160.298	200.0	175.839
-9.0	96.478	33.0	112.833	75.0	128.984	117.0	144.929	159.0	160.670		

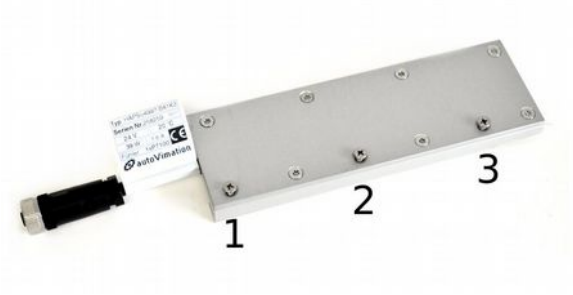
Do not set the target temperature higher than the maximum rated camera temperature!

Measure the heating plate temperature in order to check that the setting is correct!

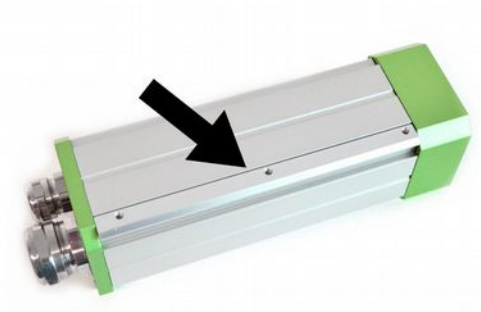
autoVimation is not liable for incorrect controller settings!

8. Mechanical assembly of the heating plate:

1. Unscrew the three cross head screw and remove the clamping rail.

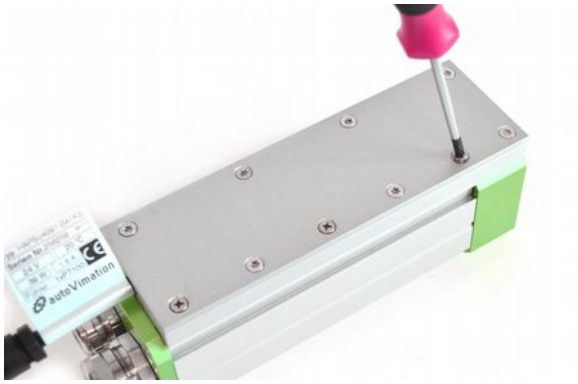


2. Place the clamping rail on top of the dovetail profile as shown below.



3. The heating plate is supplied with a graphite thermal tape for good heat transfer. Make sure that the tape is in position before you place the heating plate onto the enclosure.

4. Now place the heating plate onto the enclosure an tighten the three cross head screws firmly.

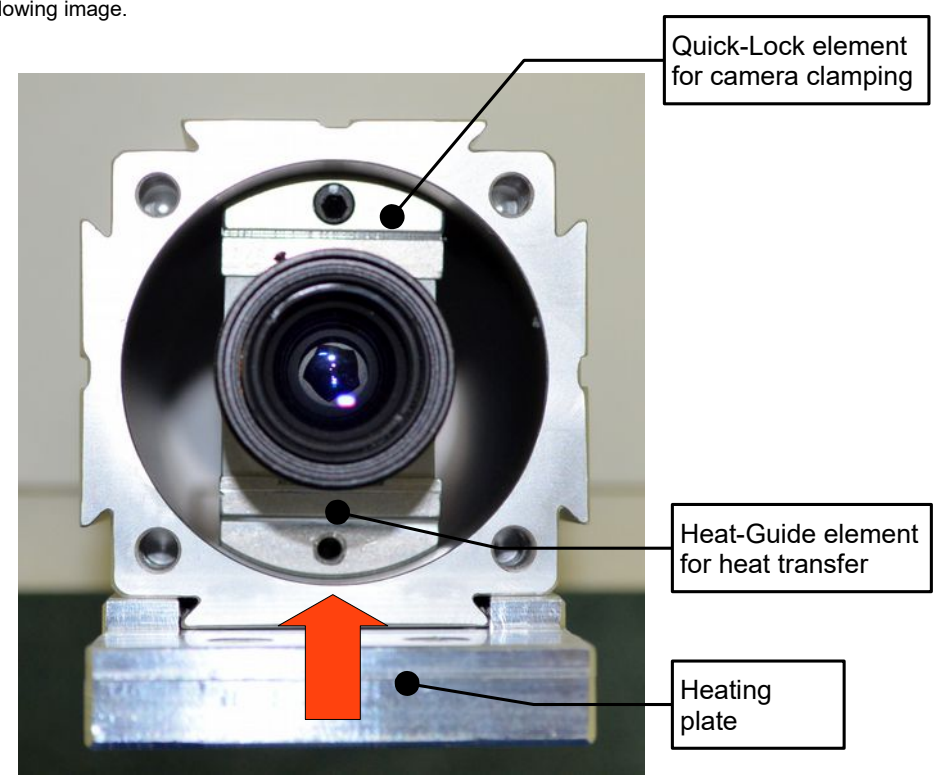


Condensation:

Assembling the enclosure in a warm/ humid environment and later use in cold areas, might lead to condensation of the humidity trapped inside the enclosure. In order to prevent this, add one or 2 dry silica bags, as they are usually included in electronics packaging, inside the enclosure. These can absorb the excessive moisture when cooling down the enclosure.

9. Camera orientation

For optimal heat transfer from the heating plate to the camera, the camera should be positioned with the heat-guide element pointing towards the heating plate, as shown in the following image.



Camera orientation for optimum heat transfer

The camera mount consists of 2 elements: quick-lock element, securing the camera in position and the heat-guide element, transferring the camera heat to the outer enclosure, at higher temperatures (passive camera cooling). At lower temperatures the heat guide element transfers the heat from the heating plate in the opposite direction, from the heating plate to the camera as shown.

For optimal heat transfer in both directions these to steps are important:

1. The heat-guide element should be placed on the side of the camera that dissipates most of the heat (usually that is the bottom side of the camera, that includes most mounting taps).
2. The heat guide should face the side of the heating plate for optimal heating performance.

For all other camera assembly steps, please follow the standard assembly manual:
“Assembly_Manual_Camera_Enclosures_autoVimation”

10. Technical Data

Controller	
Supply voltage:	24V +/-10% DC
Load currrent:	Max. 12A
Temperature control range:	-50°C - 250°C
Sensor connection:	Pt100 2-lead
Control accurancy:	<0.50°C
Power consumption (controller only)	Max. 35mA
Weight	115g
Dimensions (l x w x h):	81 x 62 x 29mm

Heating plate	
Supply voltage:	24V +/-10% DC
Heating power:	39W
Sensor:	Pt100 2-lead
Weight	485g
Dimensions (l x w x h):	195 x 64 x 16mm (without cable and connector)