IGBT Temperature monitoring - temperature model

Translation of the "Original Dokumentation"
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Name: FKT_Ueberwachung_Temperatur_IGBT_en

Version:

Version: 2019/45	
Change	**Letter symbol**
• Controller card KW-R27 added	STL

Previous version: 2018/44

Product version:

Product (AMK part no.)	Firmware Version (AMK part no.)
KW-R06 (O835) KW-R07 (O807) KW-R16 (O872) KW-R17 (O873)	AE-R05/R06 V1.10 2013/15 (204486)
KW-R24 (O901)	AE-R24 V2.03 2015/06 (205587)
KW-R24-R (O954)	AE-R24-R V2.11 2016/46 (206643)
KW-R25 (O902)	AE-R25 V2.03 2015/06 (205588)
KW-R26 (O903)	AE-R26 V2.03 2015/06 (205589)
KW-R27 (O957)	AE-R26 V2.12 2018/40 (207284)
KE, KEN, KES	KE-E03 V3.04 2013/03 (204405)
KE-xEx, KEN-xEx, KES-xEx	KE-E10 V4.02 2014/49 (205533)
iX / iC / iDT5 /	iX V1.03 2013/18 (204515)
iX(-R3) / iC(-R3) / iDT5(-R3) /	iX V2.08 2015/46 (206017)
ihXT /	ihX V1.00 2015/06 (205440)

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1 IGBT Temperature monitoring - temperature model

Supported hardware:	KW-R06 / KW-R16 / KW-R07 / KW-R17 / KW-R24 / KW-R24-R / KW-R25 / KW-R26 / KW-R27 / KE (N,S) / KE(N,S)-xEx / iX / iC / iDT5 / iX(-R3) / iC(-R3) / iDT5(-R3) / ihXT /

The temperature model integrated in the controller card allows for an optimal utilized capacity of the various modules and protects against overtemperature. The monitoring by temperature model is more exact than by I^2T monitoring.

Almost all devices with air cooling can be operated without derating.

In addition, the best possible device protection is provided in DC bus operation (drive to block) and in cyclic overload with simultaneously high base load.

The temperature model is used for device protection and can not be changed by the user. The temperature model is activated by SEEP data in the device.

2 Relevant parameters

Parameter	Name	Meaning See document 'Parameter description' (AMK part no. 203704)
ID32901 1)	'Global service bits'	Bit 9: generate error message Bit 12: liquid / air cooled cooling plate See 'ID32901 'Global service bits' bit 9' on page 6. See 'ID32901 'Global service bits' bit 12' on page 6.
ID34215 3)	'Temperature IGBT'	Temperature of IGBTs to display

1) The parameter value must be set specific to the application

3) Parameter value is automatically generated by the controller card

3 Startup instructions

Inverter with coldplate back

Inverters with coldplate back can operate either on a liquid-cooled or an air-cooled cooling plate. Parameter ID32901 'Global service bits', bit 12 must be set accordingly.

Inverter with integrated fan

The SEEP values of the cut-off temperature are increased in inverters with integrated fan (KW-F). The firmware of the controller detects these module types automatically.

4 Development

The phase currents U, V and W, the DC bus voltage and the temperature of the rear of the device are recorded for evaluation in the 1 ms cycle. The temperature model continuously calculates a model temperature of the semiconductor layers of the IGBTs.

If the calculated value reaches the IGBT maximum temperature, the power output stage is switched off immediately.

The calculated temperature can be monitored with the ID34215 'Temperature IGBT'. A record is possible, for example, with the AIPEX PRO oscilloscope function.

Appendix

ID32901 'Global service bits' bit 9

Bit no.	Condition	Meaning
9	0	**KW-R06 / KW-R16 / KW-R07 / KW-R17 / iX / iC / iDT5 / iX(-R3) / iC(-R3) / iDT5(-R3) / ihXT / KW-R24 / KW-R24-R / KW-R25 / KW-R26 / KW-R27 /** If the existing hardware does not support the temperature model, the error message 2321 'System diagnostics: IGBT monitoring' info 1 = 3 is suppressed. The temperature model takes care of the heat sink and the IGBT temperature **KE(N,S) / KE(N,S)-xEx /** DC bus is discharged via external brake resistor after SBM withdrawal
	1	**KW-R06 / KW-R16 / KW-R07 / KW-R17 / iX / iC / iDT5 / iX(-R3) / iC(-R3) / iDT5(-R3) / ihXT / KW-R24 / KW-R24-R / KW-R25 / KW-R26 / KW-R27 /** If the existing hardware does not support the temperature model, an error message 2321 'System diagnostics: IGBT monitoring' info 1 = 3 is generated. **KE(N,S) / KE(N,S)-xEx /** DC bus is not discharged in the event of SBM withdrawal In the case of an error, the DC bus is not discharged via an external brake resistor to the power supply.

ID32901 'Global service bits' bit 12

Bit no.	Condition	Meaning
12	0	**KW-R06 / KW-R16 / KW-R07 / KW-R17 / KW-R24 / KW-R24-R / KW-R25 / KW-R26 / KW-R27 /** Liquid-cooled inverter (switch-off temperature of device rear wall according to SEEP value) **KE(N,S) / KE(N,S)-xEx / iX / iC / iDT5 / iX(-R3) / iC(-R3) / iDT5(-R3) / ihXT /** Reserved
	1	**KW-R06 / KW-R16 / KW-R07 / KW-R17 / KW-R24 / KW-R24-R / KW-R25 / KW-R26 / KW-R27 /** Air-cooled inverter (Coldplate design with external air cooling) Switch-off temperature of device rear wall according to SEEP value + 15 °C (not active for -F devices with integrated air-cooling) **KE(N,S) / KE(N,S)-xEx / iX / iC / iDT5 / iX(-R3) / iC(-R3) / iDT5(-R3) / ihXT /** Reserved