

# Combustion Management System FMS





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# 1 General Information

## 1 General Information

### 1.1 Validity of these Instructions

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This instructions apply to the Combustion Management System FMS 4 and FMS 5 in any configuration.

The software-related information relates to software version v5.8. The software version can be found on the label of the programme EPROM. In case of doubt ask the LAMTEC Service - phone: +49 (0)6227 6052-33 or email: support @lamtec.de

If you use another software version as the version mentioned above, some of the described functions may not be available or some function which are available with your software version may not be described in this manual.

The devices conform to the following standards and regulations:

European directives:

2004/108/EG Electromagnetic Compatibility (EMC)

2006/95/EG Low Voltage Directive

2009/142/EG Appliances Burning Gaseous Fuels

97/23/EG Pressure Equipment Directive, conformity assessment categories IV module B and D

Harmonised European standards:

EN 298

EN 230

EN 1643 Integrated leakage check, gas line DIN DVGW PÜZ N6-2510 ASO 324

EN 12067-2

Application standards:

EN 676 if applicable

EN 267 if applicable

EN 12 952-8 u. -11 if applicable

EN 12 953-7 u. -9 if applicable

EN 50 156-1 u. -2 if applicable

EN 746-2

Test mark: CE-0085 AS 0254

#### **NOTICE**

Respect the national safety regulations and standards.

---

## 2 Safety

### 2.1 Explanation of the Symbols in the Safety Notes

---

The following symbols are used in this document to draw the user's attention to important safety information. They are located at points where the information is required. It is essential that the safety information is observed and followed, and that applies particularly to the warnings.

#### **DANGER!**

This draws the user's attention to imminent danger. If it is not avoided, it will result in death or very serious injury. The plant including its surroundings could be damaged.

---

#### **WARNING!**

This draws the user's attention to the possibility of imminent danger. If it is not avoided, it may result in death or very serious injury. The plant including its surroundings could be damaged.

---

#### **CAUTION!**

This draws the user's attention to the possibility of imminent danger. If it is not avoided, it may result in minor injuries. The plant including its surroundings could be damaged.

---

#### **NOTICE**

This draws the user's attention to important additional information about the system or system components and offers further tips.

---

The safety information described above is incorporated into the instructions.

Thus, the operator is requested to:

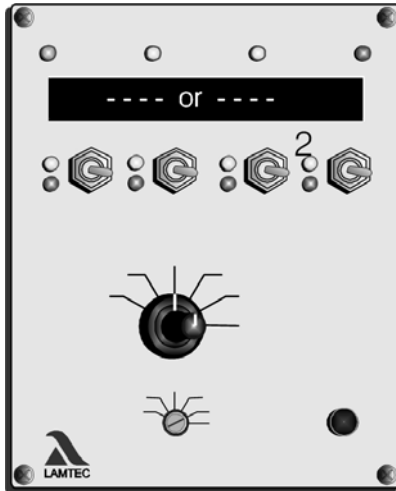
- 1 Comply with the accident prevention regulations whenever work is being carried out.
- 2 Do everything possible within his control to prevent personal injury and damage to property.

## 3 Commissioning

### 3 Commissioning

#### 3.1 O<sub>2</sub> Trim

##### 3.1.1 Reset fault



#### **Manually:**

Turn selector switch to 'O<sub>2</sub> TRIM' mode.  
Press the key ENTER and call up error text.  
Push key 3 (2) upwards



#### **WARNING!**

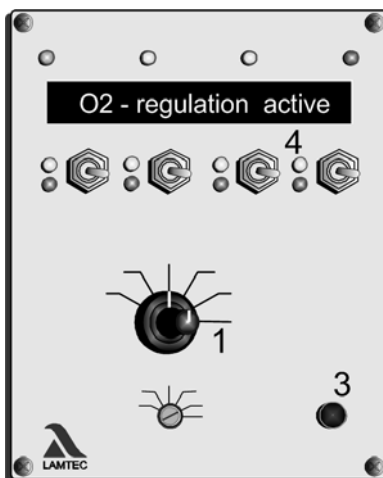
Before deleting a fault, it is absolutely necessary to call up the fault text!

► Press the ENTER key to call up the fault text.

#### **Automatically:**

O<sub>2</sub> faults will be reset automatically at every burner start-up.

##### 3.1.2 Calling up O<sub>2</sub> Trim Text Messages



Switch display to O<sub>2</sub>-trim.  
Turn selection switch (1) to STATUS,  
Push channel key 3 (4) upwards

Press the ENTER key (3) to call up the indication.

Back → press ENTER key again (3),  
or turn selection switch (1) to another position.

### 4 System Operation

#### 4.1 Mode Display

##### 4.1.1 Mode Abbreviations Used

---

ON	→	SWITCH-ON SEQUENCE
BE	→	READY
ZÜ	→	IGNITION POSITION
EZ	→	SETTING/IGNITION
GL	→	BASE FIRING RATE
EG	→	SETTING/BASE FIRING RATE
NA	→	POST-PURGE
AU	→	OFF
EI	→	SETTING
SL	→	CLEAR MEMORY
EV	→	SETTING/PRE-PURGE
ES	→	SETTING/CONTROL
ST	→	FAULT
VO	→	PRE-PURGE
HA or HAND	→	MANUAL MODE
LE	→	FIRING-RATE EXTERN
no indication	→	CONTROL MODE

BE indicates that the signal is present on terminal 2, and all other signals = 0  
If the FMS controls a flue gas damper, it opens. It is possible to switch to SETTINGS.

ZÜ indicates that pre-purge is finished and the ignition position relay pulls on. The FMS is in the ignition position, but the flame signal is absent. Switching to SETTING merely causes the mode display to switch to EZ. Programming is not possible in this mode.

GL indicates that the burner is on (terminal 8=1), but the control release is absent (terminal 4=0). The FMS therefore remains in base firing rate position. Switching to SETTING merely causes the mode display to switch to EG. Programming is not possible in this mode.

NA indicates that the FMS is in post-purge mode.  
All signals = 0  
All air channels open. When the configured time has elapsed, the FMS changes to AU mode.

AU indicates that the FMS is OFF. All control elements closed.  
Selector switch on AUTOMATIC, all signals = 0

EI indicates that the mode selector switch is on SETING. Single points can now be altered or new curves can be entered.

SL indicates that the mode selector switch is set to CLEAR MEMORY. By pressing the ENTER key the existing curve is cleared and a new curve can be entered.

## 4 System Operation

ES	indicates that although the mode selector switch is on SETTING. It's control function is working according to a calculated curve in the RAM. The curve is calculated from a partial curve, which is already entered. This mode is reached if the burner is switched off and is restarted during a programming sequence. The programming can be continued by operating a switch (change to 'EI' mode). Flame signal and control release are present.
ST	indicates that the FMS is set to FAULT. The fault code can be called up in switch position STATUS. In the switch position FIRING RATE the firing-rate at the time when the fault occurs, is displayed.
VO EV	indicates that FMS is in PRE-PURGE mode. PRE-PURGE is active. Switching to SETTING only changes the indication of the mode in EV. Programming is not possible in this mode.
HAND or HA	indicates that the FMS has been switched to manual mode whilst the burner is running. In the selector switch position FIRING RATE the firing-rate can be adjusted by actuating the channel 1 switch. To quit manual mode, actuate any switch but the channel 1 switch.
ext.Hand	indicates that the FMS was switched to manual operation, but the firing-rate was specified externally and not via the channel 1 key (that is, e.g. via remote software or bus).
LE	indicates that the output controller of the FMS is deactivated and the firing rate is controlled by an external signal

### 4.1.2 O2 Trim Modes

---

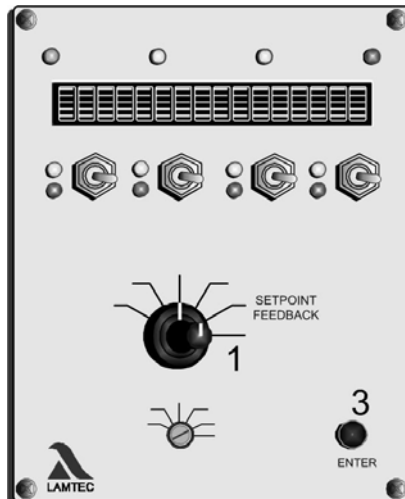
- op O<sub>2</sub> trim in standby (during burner start-up), or O<sub>2</sub> trim temporarily switched off as a function firing rate via parameters 914 and 915.
- or O<sub>2</sub> - trim active.
- ot O<sub>2</sub> trim temporarily deactivated (air deficiency, probe dynamics etc).
- od O<sub>2</sub> trim deactivated (fault), e.g. test routine failed during burner start-up, dynamic test negative, O<sub>2</sub> trim temporarily deactivated for over 1 hour etc.
- C Optimisation at increasing firing rate
- c Optimisation at decreasing firing rate



## 4 System Operation

### 4.2 Check Sums - Hours of Operation

#### 4.2.1 Calling the Checksums



Switch (1) to SETPOINT FEEDBACK

Press ENTER (3) and keep pressed

- the display shows the checksum and the safety times one after the other.

Each of the parameter levels is safeguarded by its own checksum. The checksum for each level and the safety and pre-purge times are displayed here in succession.

Order:

- |              |   |
|--------------|---|
| CRC 16 level | 0: adjustable without password                                      |
|              | 1: adjustable by person commissioning                               |
|              | 2: adjustable by the burner manufacturer or the boiler manufacturer |
|              | 3: adjustable by LAMTEC only  |
|              | 4: adjustable by LAMTEC only  |

1<sup>st</sup> oil safety time in seconds

2<sup>nd</sup> oil safety time in seconds

1<sup>st</sup> gas safety time in seconds

2<sup>nd</sup> gas safety time in seconds

Pre-purge time in seconds

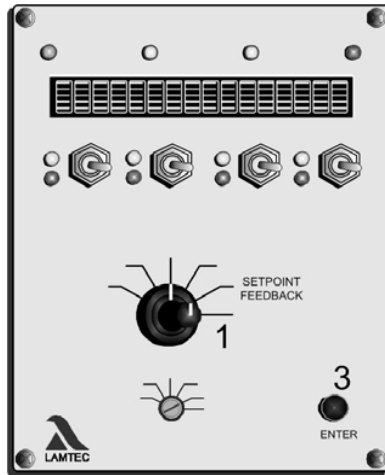
On the FMS without pilot burner the statement of the 2<sup>nd</sup> safety time contains safety time. The statement of the 1<sup>st</sup> safety time is then irrelevant.

#### **NOTICE**

If the parameter has been changed, the checksum will change, too, if a total reboot has been proceeded or the duration of 1h has passed.

## 4 System Operation

### 4.2.2 Displaying the Running Time Meter



Turn selector switch (1) to SETPOINT

→ the display shows a moving text with the following content:

- total running hours
- running hours on curve set 1
- starts on curve set 1
- running hours on curve set 2
- starts on curve set 2

If you use the 4 curve set or 8 curve set option the display shows the running hours and starts on the additional curve sets.

#### NOTICE

The sum of the curve set 1 running hours and curve set 2 running hours does not necessarily give the running hours value, which is displayed in total. The total counter relates to the FMS running hours. It runs as soon as the unit is connected to a power supply (this also provides the basis for the fault history).

The single running time meters relate to the burner running hours. These run as soon as the burner is in operation with the respective curve set (flame signal to the FMS).

## 4.3 Messages / Faults

### 4.3.1 What Happens if There is a Fault?

#### NOTICE

If the processor detects a fault, it runs the outputs in the programmed direction, e.g. air on, fuel off, re-circulation closed.

The fuel solenoid valves close. The fault signal relay pulls on with a few seconds delay. Automatic restarting may be possible, depending on the nature of the fault.

## 4 System Operation

### 4.3.2 Reading Faults

---

Red LED fault lights up

Switch (1) to STATUS

→ Fault code is displayed

Note code and firing rate values (external and internal).

Press Enter (3)

→ The display shows plain text message including running time meter reading up to the time of the fault

A list of the fault codes, error texts and help can be found in the document "Commissioning Supplement List of Fault Codes for FMS/VMS/ETAMATIC/ETAMATIC OEM/FA1" (Publication no. DLT1050).

### 4.3.3 Resetting Faults

---

Switch to STATUS.

Left-hand switch up

→ the fault is cleared unless the cause is still directly present.

Alternative:

FMS: Set signal on terminal 3 briefly (min. 2 seconds) via external switch.

→ Fault is cleared!

## 4 System Operation

### 4.3.4 Recalling Fault History

#### NOTICE

The FMS stores the last 10 faults with the associated running time meter values



Turn selector switch (1) to STATUS

→ the display shows the actual status

Channel 1 switch (4) up

→ the display shows the latest fault code and the firing rate values from the moment when the fault occurs

Press ENTER (3)

→ the display shows text and running time meter reading

Channel 1 switch (4) up again

→ the display shows the last but one fault code and the firing rate values from the moment when the fault occurs

Press ENTER (3)

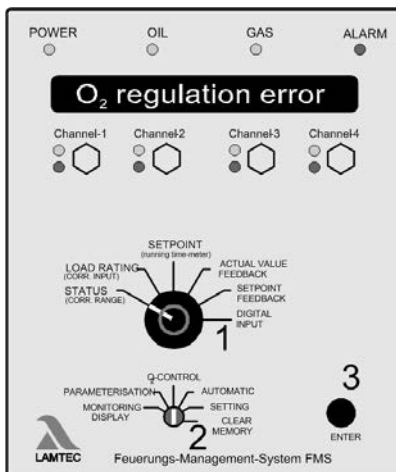
→ the display shows the fault code and the related operating mode.

You can browse through the fault history by pressing the channel 1 switch

#### NOTICE

If it is assured that the FMS has been set on power since the last fault, the time of the fault can be determined with the help of the current running time meter reading and the current time.

### 4.3.5 What happens if a fault occurs in the O<sub>2</sub> trim?



In the event of a fault, the display shows a warning message and the O<sub>2</sub> controller is deactivated.

The specified base value 'Without control' or the one for 'Air shortage' is set.

The display shows the running text 'O<sub>2</sub> trim at fault'.

The burner would not be shut down.

Turn selector switch to STATUS to call up the corresponding error code.

The display shows a plain text message about the cause of error after you pressed the ENTER key (3).

## 4 System Operation

### 4.3.6 Air Deficiency Failure

If the O<sub>2</sub> actual value is significantly smaller than the O<sub>2</sub> setpoint value (below the second monitoring band) and corrective actions by the FMS cannot clear this error, then the trim is deactivated and the base value for air deficiency errors will be put out.

At air deficiency, the FMS triggers an air deficiency burner shut-down. Therefore set P 897 to 1.

The error code is H360, "Error shut-down by O<sub>2</sub> trim".

### 4.3.7 Resetting O<sub>2</sub> Errors

O<sub>2</sub> errors are automatically reset with each new burner start-up. This is permissible, since a 100 % O<sub>2</sub> measurement test is performed at each start-up.

Manual resetting of O<sub>2</sub> errors is possible at any time, as follows:

Switch (1) to STATUS

→ FMS in O<sub>2</sub> trim mode?

If not, switch over to O<sub>2</sub> trim mode by pushing channel key 3 (4) upwards

Press the ENTER key (3) and call up the cause of error (mandatory!)

Push key 3 (4) upwards

### 4.3.8 Calling Fault History O<sub>2</sub> trim

Switch over to FMS / Combustion Management System mode (controller of fuel/air ratio control).

Turn selector switch (1) to STATUS

Switch channel 3 down

→ You can browse through the fault history with channel key 2



1 ↑ current fault	147 ↑ internal firing-rate	1 ↑ curve set	000 487 ↑ operating hours
-------------------------	----------------------------------	---------------------	---------------------------------

The display of O<sub>2</sub> history disappears automatically after 5 sec.

O<sub>2</sub> controller faults lasting over 30 sec. are stored. They are only stored in the EEPROM, once the fault is cleared or the FMS leaves the operating modes 'Controller' or 'Base firing rate'.

## 4 System Operation

### 4.4 Maintenance

#### 4.4.1 Replacing Relay Module R16

---

The relay module for controlling the valves is subject to wear and tear. This abrasion depends upon the firing rate of the contacts and the numbers of the working cycle.

#### **NOTICE**

For safety reasons the relay module 660R0016 has to be replaced after 250 000 starts or after a period of 10 years.

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The starts which the FMS had completed successfully, are shown under the function "Calling up running time meter".

The starts, on all curve sets have to be added together.

When the sum reaches 250 000 the relay module has to be replaced.

#### **NOTICE**

For exchange of the fuses F1-F11 these specifications are to be complied:

- high breaking capacity according to IEC 60127-2, Sheet 5: 1500A @ 250VAC
  - F1, F2, F3, F6
    - 2A slow blow
    - melting integral  $I^2t < 40 \text{ A}^2\text{s}$
    - z.B. Littelfuse 0215002.(M)XP
  - F4, F5, F10
    - 1A slow blow
    - Schmelzintegral  $I^2t < 20 \text{ A}^2\text{s}$
    - z.B. Littelfuse 0215001.(M)XP
  - F7, F8, F9, F11
    - 0,5A slow blow
    - melting integral  $I^2t < 10 \text{ A}^2\text{s}$
    - z.B. Littelfuse 0215.500(M)XP
-

5 Appendix

5.1 Declaration of Conformity



**EG-Konformitätserklärung**

EC Declaration of Conformity  
Déclaration CE de Conformité

Wir (We / Nous) **LAMTEC Meß- und Regeltechnik für Feuerungen GmbH & Co. KG**  
**Wiesenstraße 6**  
**D-69190 Walldorf (Baden)**

erklären, dass die (declare that) (déclarons que)  
inkl. (inclusive) (y compris)  
**FMS - Brennersteuerung**  
**den Erweiterungsmodulen:**  
(additional modules, modules complémentaires)  
**- R16V4**  
**- R16V4M**  
**- R13**  
**- R131**  
**- Kommunikationsprozessor**

Produkt-ID-Nummer: (Product Id Number) (Numéro d'identification du produit)	<b>FMS</b>	<b>664F00 / 665F00</b>
	<b>R16V4</b>	<b>660R0016</b>
	<b>R16V4M</b>	<b>660R0016V4M</b>
	<b>R13</b>	<b>660R0013</b>
	<b>R131</b>	<b>660R0131</b>
	<b>Kommunikationsprozessor</b>	<b>663P0401</b>

auf welche sich diese Erklärung bezieht, mit den folgenden Norm(en) übereinstimmt  
(to which this declaration relates conforms to the following standard(s))  
(sur laquelle cette déclaration se réfère, et conformément aux dispositions de la norme(s))

- DIN EN 298: 2012-11
- DIN EN 1643: 2014-09
- DIN EN 12067-2: 2004-06
- DIN EN 13611: 2011-12
- DIN EN 60730-2-5: 2011-03
- DIN EN 60730-1: 2012-10

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gemäß den Bestimmungen der folgenden Richtlinie(n).  
 (according to the provisions of the following directive(s))  
 (conformément aux dispositions de la directive(s))

Nummer (Number / Numéro)	Text (Text / Texte)
2014/35/EU	Niederspannungsrichtlinie
2014/35/EU	Low Voltage Directive
2014/35/UE	Directive basse tension
2014/30/EU	EMV-Richtlinie
2014/30/EU	EMC Directive
2014/30/UE	Directive CEM
2014/68/EU	Druckgeräterichtlinie Kat.4 Mod. B+D
2014/68/EU	Pressure Equipment Directive
2014/68/UE	Directive équipements sous pression
2009/142/EG	Gasverbrauchseinrichtungen
2009/142/EC	Gas Appliance Directive
2009/142/CE	Directive appareils à gas

Das Datenblatt und gegebenenfalls die Basisdokumentation sind zu beachten.  
 (The data sheet and basic documentation, if any, have to be considered.)  
 (La consultation de la fiche technique, et éventuellement de la documentation technique de base, est requise.)

Hinweise zur Anwendung der Richtlinie 2014/35/EU und 2014/30/EU:  
 Die Konformität mit 2009/142/EG setzt die Übereinstimmung mit 2014/35/EU voraus und beinhaltet diese.  
 Die Konformität mit 2014/30/EU ist nach Einbau des Bauteils in das Endgerät nachzuweisen und zu erklären.

Remarks regarding the application of directive 2014/35/EU and 2014/30/EU:  
 Conformity with 2009/142/EC presupposes that requirements of 2014/35/EU are fulfilled and includes these.  
 Conformity with 2014/30/EU has to be proved and declared after installation of the component.

Remarques sur l'application des directives 2014/35/UE et 2014/30/UE:  
 La conformité avec la 2009/142/CE intègre la conformité avec la 2014/35/UE.  
 La conformité avec la 2014/30/UE après l'installation de l'appareil est à prouver et à déclarer.

Anbringung der CE-Kennzeichnung: ja  
 (Placing of the CE marking)  
 (L'apposition du marquage CE)

CE<sub>0036</sub>  
**CE-0085 AS0254**

Waldorf, 19.07.2016  
 H.J. Altendorf, Geschäftsführung

Rechtsverbindliche Unterschrift  
 (Authorised signature) (Signature autorisée)

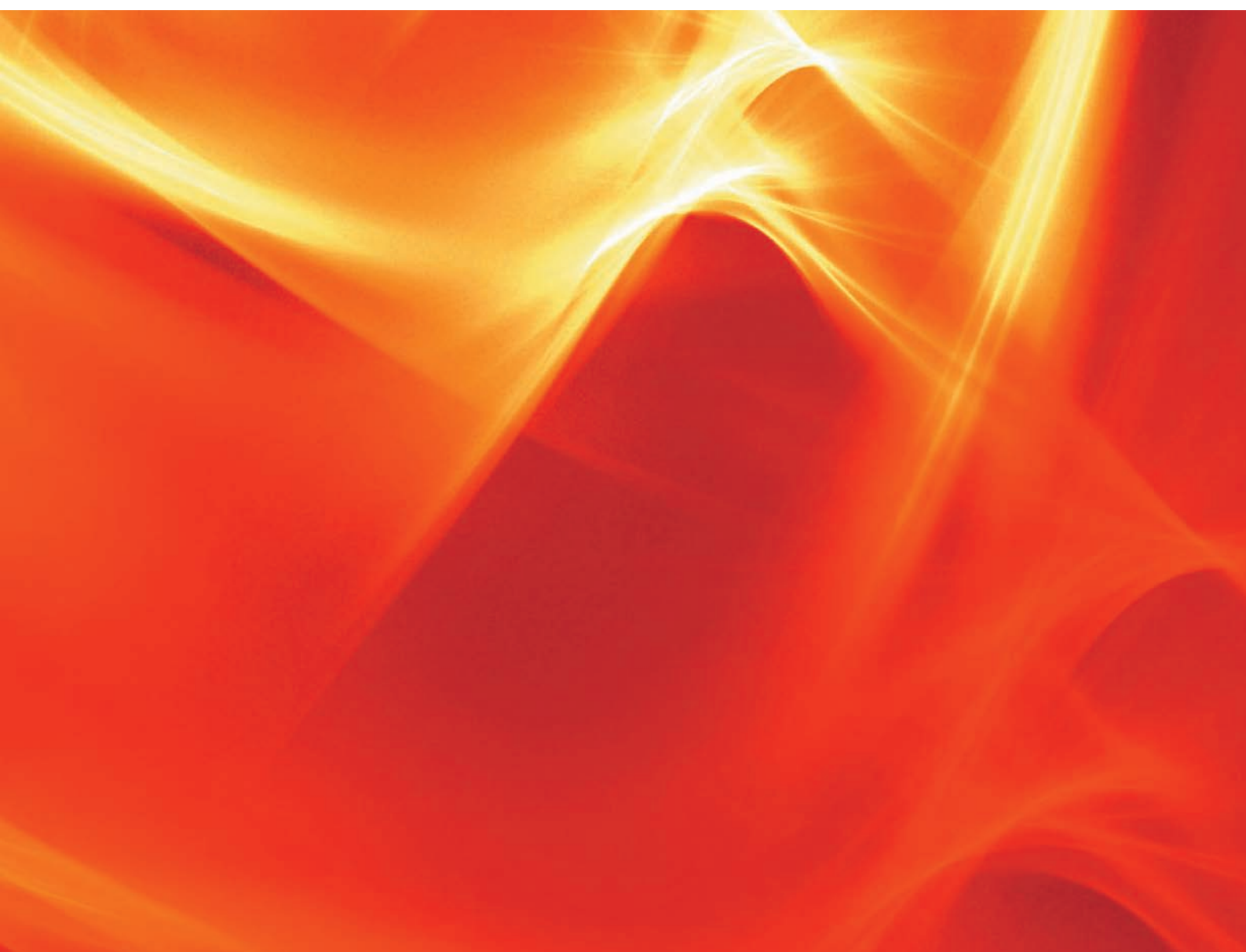
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The information in this publication is subject to technical changes.



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