SIEMENS

7138

ISO 9001

CE

Oil Burner Controls LMO64...

Microcontroller-based oil burner controls for the supervision, startup and control of forced draft oil burners in intermittent operation. Oil throughput up to 30 kg / h.

The LMO64... and this Data Sheet are intended for use by OEMs which integrate the burner controls in their products.

Use, features

The LMO64... burner controls are designed for the startup and supervision of single- or 2-stage forced draft oil burners in intermittent operation. Yellow-burning flames are supervised with photoresistive detectors QRB..., blue-burning flames with blue-flame detectors QRC... .

- Forced draft oil burners conforming to EN 267
- Burner controls for use with atomization burners of monoblock design conforming to EN 230

General features

- Undervoltage detection
- Electrical remote reset
- Bridging contact for oil preheater
- Monitoring of time for oil preheater
- Accurate and reproducible program sequence through digital signal handling
- Controlled intermittent operation after 24 hours of continuous operation
- Limitation of the number of repetitions
- Multicolor indication of fault and status messages

Specific features

- Postpurge function for clearing the combustion chamber after burner operation

Warning notes

To avoid injury to persons, damage to property or the environment, the following warning notes should be observed!

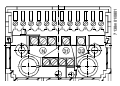
Do not open, interfere with or modify the unit!

- Before performing any wiring changes in the connection area of the LMO64..., completely isolate the burner control from the mains supply (all-polar disconnection)
- Ensure protection against electric shock hazard by providing adequate protection for the burner control's connection terminals
- Check wiring and all safety functions prior to commissioning
- Press the lockout reset button / operation button only manually (applying a force of no more than 10 N), without using any tools or pointed objects
- Fall or shock can adversely affect the safety functions. Such units may not be put into operation, even if they do not exhibit any damage

Mounting notes

- Ensure that the relevant national safety regulations are complied with

Installation notes



- Installation work must be carried out by qualified staff
- To ensure that the LMO64... does not get mixed up with other types of burner controls, it may only be used in connection with the grey plug-in base AGK11.6. In particular, it must be made certain that the line for the control thermostat or pressurestat «R» is picked up after the limit thermostat and pressure switch «W» and safety limit thermostat «SB», to be connected to terminal 7 (refer to «Connection diagram»)
- Always run the high-voltage ignition cables separately while observing the greatest possible distances to the unit and to other cables
- Install switches, fuses, earthing, etc., in compliance with local regulations
- Ensure that the maximum permissible amperages will not be exceeded (refer to «Technical data»)
- Do not feed external mains voltage to the control outputs of the unit. When testing the devices controlled by the burner control (fuel valves, etc.), the LMO64... may never be plugged in
- Do not mix up live and neutral conductors

Electrical connection of the flame detector

It is important to achieve practically disturbance- and loss-free signal transmission:

- Never run the detector cable together with other cables
  – Line capacitance reduces the magnitude of the flame signal
  – Use a separate cable
- Note the maximum permissible detector cable lengths (refer to «Technical data»)

Commissioning notes

- Commissioning and maintenance work must be carried out by qualified staff
- When commissioning the plant or when doing maintenance work, make the following safety checks:

	Safety check	Anticipated responce
a)	Burner startup with flame detector darkened	Lockout at the end of «TSA»
b)	Burner startup with flame detector exposed to extraneous light	Lockout after no more than 40 seconds
c)	Burner operation with simulated flame failure; for that purpose, darken the flame detector during operation and maintain that status	Start repetition followed by lockout at the end of «TSA»

Norms and standards

CE conformity according to the directives of the European Union
- Electromagnetic compatibility EMC (Immunity) 89 / 336 EEC
- Low-voltage directive 73 / 23 EEC

Service notes

Check wiring and all safety functions each time a burner control has been replaced.

Disposal notes

The unit contains electrical and electronic components and may not be disposed of together with household barbadge.
Local and currently valid legislation must be observed.

Mechanical design

The housing is made of impact-proof, heat-resistant and flame-retarding plastic.
It is of plug-in design and engages audibly in the base.
Burner controls type LMO64... and plug-in bases AGK11.6 are silver-grey (RAL7001).

The housing accommodates the
- microcontroller, which controls the program sequence, and the relays for load control,
- electronic flame signal amplifier,
- lockout reset button with its integrated 3-color signal lamp for status and fault messages and the socket for connecting the interface adapter OCI400

Display and diagnosis
- Multicolor display of status and fault messages
- Transmission of status and fault messages as well as detailed service information by additional interface adapter OCI400 and PC Windows software ACS400.

Type summary

Type reference	Mains voltage	Fuel valve stages	Burner capacity	[1])	Remote reset	Times						
						tw max.	t1 / t1´ min.	TSAmax.	t3 min.	t3n max.	t4 min.	t8 max.
Standard versions												
LMO64.300B2	AC 230 V	1	< 30 kg / h	•	•	5 s	15 / 16 s	10 s	15 s	10 s	---	20 s
LMO64.301B2	AC 230 V	1	< 30 kg / h	•	•	5 s	15 / 16 s	10 s	15 s	10 s	---	90 s
LMO64.302B2*	AC 230 V	1	< 30 kg / h	•	•	5 s	15 / 16 s	10 s	15 s	3 s	---	20 s
LMO64.310B2	AC 230 V	2	< 30 kg / h	•	•	5 s	15 / 16 s	10 s	15 s	10 s	15 s	20 s
LMO64.311B2	AC 230 V	2	< 30 kg / h	•	•	5 s	15 / 16 s	10 s	15 s	10 s	15 s	90 s

* On request only!

Legend

TSAmax.	Maximum ignition safety time
tw	Waiting time
t1	Prepurge time
t1´	Purge time
t3	Preignition time
t3n	Postignition time
t4	Interval from flame signal to the release of «BV2»
t8	Postpurge time
[1])	Bridging contact for oil preheater

Ordering

Oil burner control, (without grey plug-in base) — refer to «Type summary»

Plug-in base (grey) — **AGK11.6**

Electrical connections — refer to Data Sheet 7201
- Plug-in base AGK11.6
- Cable holders AGK65, AGK66, AGK67...
- Cable strain relief elements for AGK67...

Flame detectors
- Photoresistive detectors QRB1... — refer to Data Sheet 7714
- Blue-flame detectors QRC1... — refer to Data Sheet 7716

Diagnostic tool — refer to Data Sheet 7614
- Interface adapter OCI400
- PC Windows software ACS400

Technical data

General unit data

Mains voltage	AC 230 V +10 % / -15 %
Mains frequency	50...60 Hz ±6 %
External primary fuse (Si)	6.3 A (slow)
Power consumption	12 VA
Mounting position	optional
Weight	approx. 200 g
Degree of protection	IP 40 (to be ensured through mounting)
Perm. cable lengths	max. 3 m at a line capacitance of 100 pF / m
- from terminal 7 to «R»	max. 20 m at 100 pF / m
Detector cable laid separately	20 m
Remote reset laid separately	20 m

Max. perm. amperage at cos φ ≥ 0.6	LMO64.30...	LMO64.31...
Terminal 1	5 A	5 A
Terminals 3 and 8	3 A	5 A
Terminals 4, 5, 6 and 10	1 A	1 A

Environmental conditions

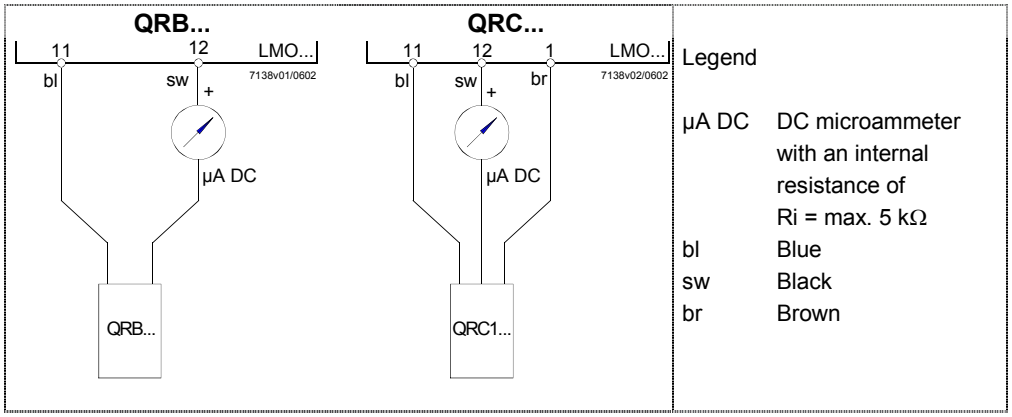
Transport	DIN EN 60 721-3-2
Climatic conditions	class 2K2
Mechanical conditions	class 2M2
Temperature range	-30...+70 °C
Humidity	< 95 % r.h.
Operation	DIN EN 60 721-3-3
Climatic conditions	class 3K5
Mechanical conditions	class 3M2
Temperature range	
- LMO64...	-5...+60 °C
- LMO64...	-20...+60 °C
Humidity	< 95 % r.h.

⚠ **Condensation, formation of ice and ingress of water are not permitted!**

Flame supervision with QRB... and QRC...

	Min. detector current required (with flame)	Max. perm. detector current (without flame)	Max. possible detector current with flame (typically)
QRB...	45 µA	5.5 µA	100 µA
QRC...	70 µA	5.5 µA	100 µA

Measurement circuit for detector current



As an alternative to detector current measurement, the diagnostic tool OCI400 / ACS400 can be used. In that case, connection of the DC microammeter is not required.

Function

Preconditions for startup

- Burner control is reset
- All contacts in the line are closed and there is demand for heat
- No undervoltage
- Flame detector is darkened and there is no extraneous light

Undervoltage

- Safety shutdown in the operating position takes place should the mains voltage drop below about AC 165 V (U_N = AC 230 V)
- Restart is initiated when mains voltage exceeds about AC 175 V (U_N = AC 230 V)

Time supervision oil preheater

If the oil preheater's release contact does not close within 10 minutes, the burner control will initiate lockout.

Controlled intermittent operation

After 24 hours of continuous operation at the latest, the burner control will initiate automatic safety shutdown followed by a restart.

Control sequence in the event of fault

If lockout occurs, the outputs for the fuel valves, burner motor and ignition will immediately be deactivated (< 1 second).

Cause	Response
Mains failure	Restart
Voltage has fallen below the undervoltage threshold	Restart
Extraneous light during «t1»	Lockout at the end of «t1»
Extraneous light during «tw»	Prevention of startup, lockout after no more than 40 seconds
No flame at the end of «TSA»	Lockout at the end of «TSA»
Flame is lost during operation	Max. 3 repetitions, followed by lockout
Oil preheater's release contact does not close within 10 min.	Lockout

In the event of lockout, the LMO64... remains locked (lockout cannot be changed), and the red signal lamp will light up.
The burner control can immediately be reset.
This status is also maintained in the case of a mains failure.

Resetting the burner control

Whenever lockout occurs, the burner control can immediately be reset. To do this, press the lockout reset button for about 1 second (< 3 seconds).

Ignition program with LMO64.302...

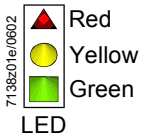
If the flame is lost during «TSA», the burner will be reignited, but not later than at the end of «TSAmax.».
This means that several ignition attempts can be made during «TSA» (refer to «Program sequence»).

Limitation of repetitions

If the flame is lost during operation, a maximum of 3 repetitions can be made.
Each time the flame is lost during operation, safety lockout will be initiated.
The red signal lamp will flash.
If the flame is lost for the fourth time during operation, the burner will initiate lockout.
The repetition count is restarted each time controlled switching on by «R-W-SB» takes place.

Operation

Lockout reset button «EK...» is the key operating element for resetting the burner control and for activating / deactivating the diagnostic functions.

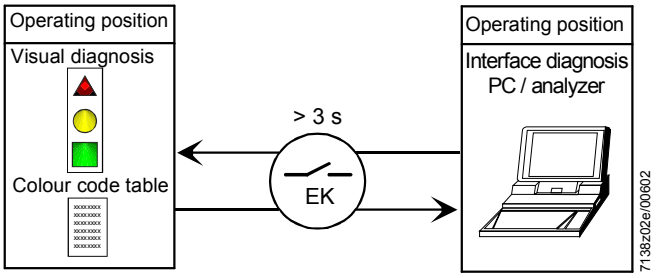


The multicolor LED is the key indicating element for both visual diagnostics and interface diagnostics.

Both «EK...» and LED are located under the transparent cover of the lockout reset button.

There are 2 diagnostic choices available:
1. Visual diagnostics: Operational status indication.
2. Interface diagnostics: With the help of the interface adapter OCI400 and PC software ACS400 or flue gas analyzers of different makes (refer to Data Sheet 7614).

Visual diagnostics:
In normal operation, the different operational statuses are indicated in the form of color codes according to the color code table. Interface diagnostics is activated by pressing the lockout reset button for at least 3 seconds (refer to Data Sheet 7614). If, by accident, interface diagnostics has been activated, in which case the slightly red light of the signal lamp flickers, it can be deactivated by pressing again the lockout reset button for at least 3 seconds. The moment of switching over is indicated by a yellow light pulse.



Operational status indication

During startup, status indication takes place according to the following table:

Color code table		
Status	Color code	Color
Waiting time «tw», standby on continuous phase, waiting statuses	❍.....	Off
Oil preheater heats	●.....	Yellow
Ignition phase, ignition controlled	● ❍● ❍● ❍● ❍● ❍●	Flashing yellow
Operation, flame o.k.	❑.....	Green
Operation, flame not o.k.	❑ ❍❑ ❍❑ ❍❑ ❍❑ ❍	Flashing green
Extraneous light on burner startup	❑ ▲ ❑ ▲ ❑ ▲ ❑ ▲ ❑ ▲ ❑	Green-red
Undervoltage	● ▲ ● ▲ ● ▲ ● ▲ ● ▲ ●	Yellow-red
Fault, alarm	▲.....	Red flashing
Output of fault code (refer to «Error code table»)	▲❍ ▲❍ ▲❍ ▲❍ ▲❍	Red flicker light
Interface diagnosis	▲ ▲ ▲ ▲ ▲ ▲ ▲	Red flicker light

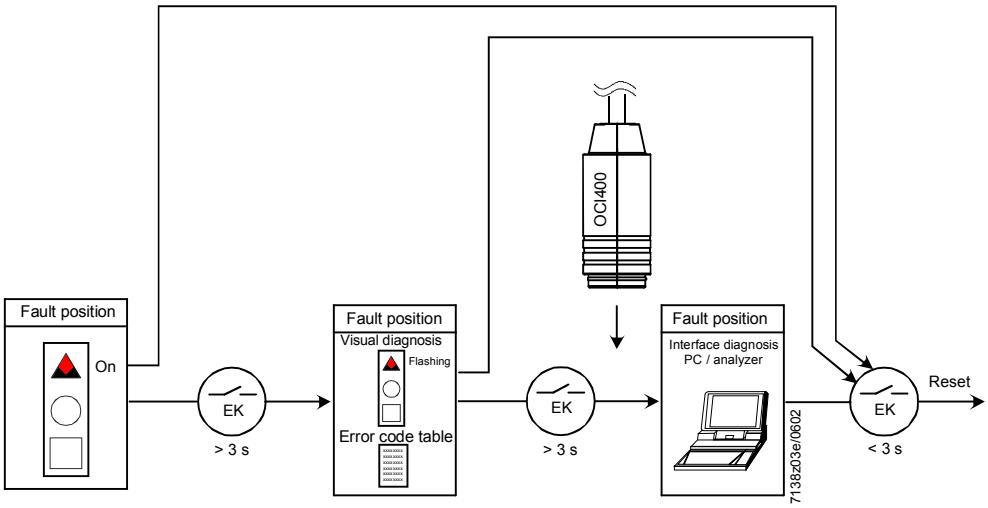
Legend

..... Permanent
❍ Off
▲ Red
● Yellow
❑ Green

Diagnosis of cause of fault

After lockout, the red fault signal lamp remains steady on.
In that condition, the visual diagnosis of the cause of fault according to the error code table can be activated by pressing the lockout reset button for more than 3 seconds. Pressing the reset button again for at least 3 seconds, the interface diagnosis will be activated (for more detailed information, refer to Data Sheet 7614).

The following sequence activates the diagnosis of the cause of fault:



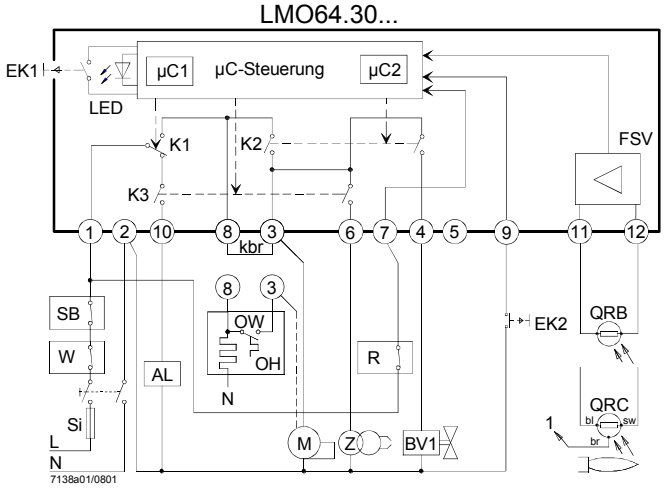
Error code table	
Blink code	**Possible cause**
2 blinks • •	No establishment of flame at the end of «TSA» - Faulty or soiled fuel valves - Faulty or soiled flame detector - Poor adjustment of burner, no fuel - Faulty ignition equipment
3 blinks • • •	Free
4 blinks • • • •	Extraneous light on burner startup
5 blinks • • • • •	Free
6 blinks • • • • • •	Free
7 blinks • • • • • • •	Too many losses of flame during operation (limitation of the number of repetitions) - Faulty or soiled fuel valves - Faulty or soiled flame detector - Poor adjustment of burner
8 blinks • • • • • • • •	Timer supervision oil preheater
9 blinks • • • • • • • • •	Free
10 blinks • • • • • • • • • •	Wiring fault or internal fault, output contacts, or other faults

During the time the cause of fault is diagnosed, the control outputs are deactivated. The burner remains shut down.

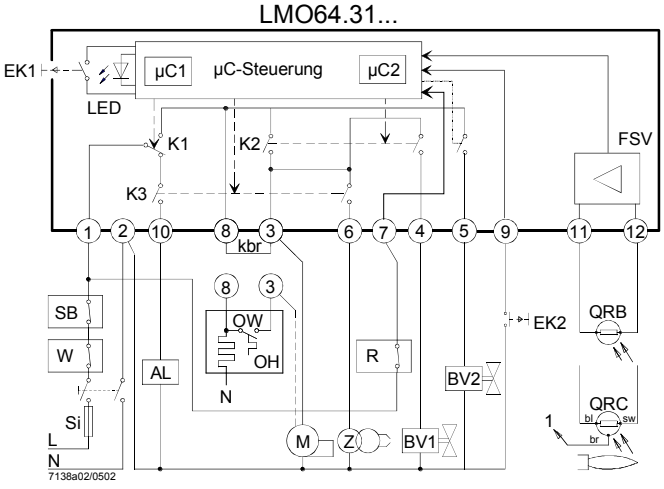
The diagnosis of the cause of fault is quit and the burner switched on again by resetting the burner control. Press lockout reset button for about 1 second (< 3 seconds).

Connection diagram and internal diagram

LMO64.30...

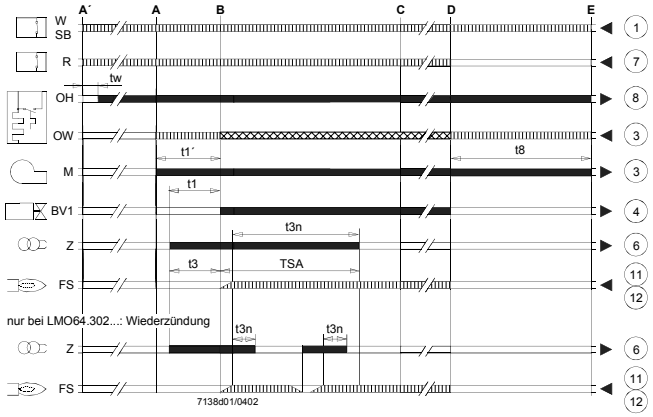


LMO64.31...

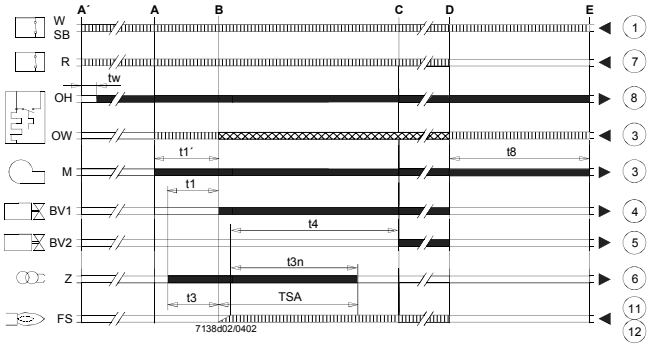


Control sequence

LMO64.30...



LMO64.31...



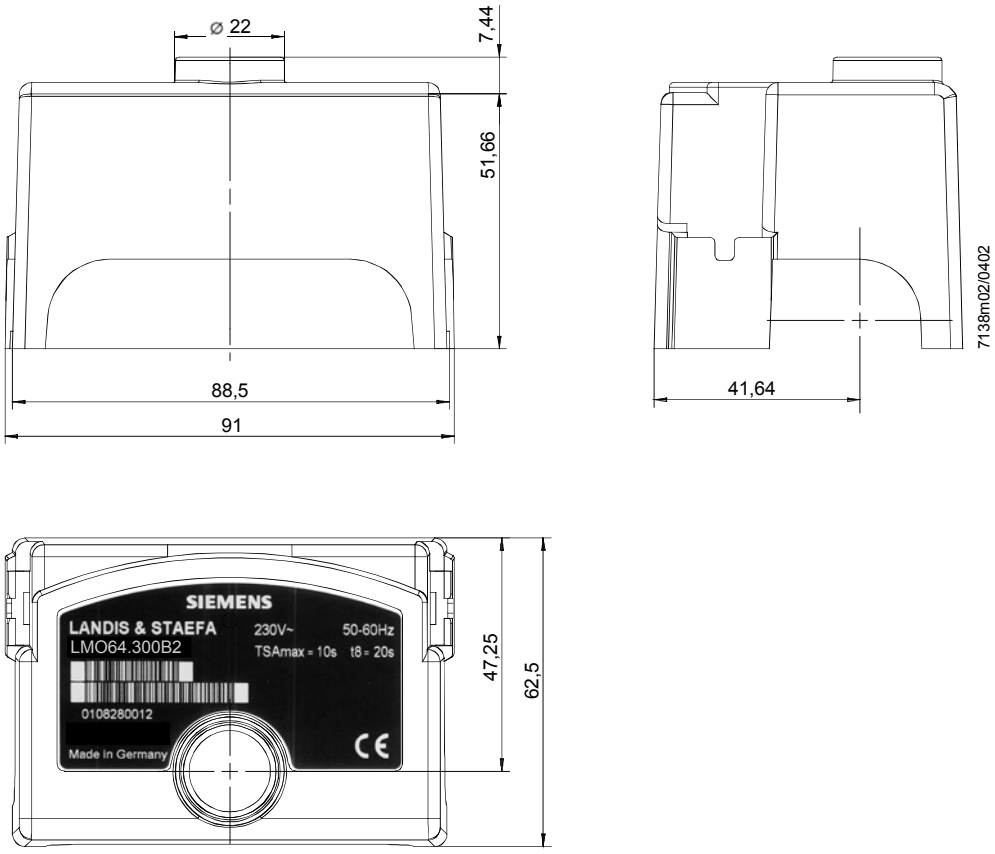
Legend

AL	Alarm device	OW	Release contact of oil preheater
BV...	Fuel valve	OH	Oil preheater
EK1	Lockout reset button	QRB	Photoresistive detector
EK2	Remote lockout reset button	QRC	Blue-flame detector bl = blue, br = brown, sw = black
FS	Flame signal		
FSV	Flame signal amplifier	R	Control thermostat or pressurestat
K...	Contacts of control relay	SB	Safety limit thermostat
kbr	Cable link (required only when oil preheater is not used)	Si	External primary fuse
LED	3-color signal lamps	W	Limit thermostat or pressure switch
M	Burner motor	Z	Ignition transformer
TSA	Ignition safety time	t3n	Postignition time
tw	Waiting time	t4	Interval from flame signal to release «BV2»
t1	Prepurge time		
t1´	Purge time	t8	Postpurge time
t3	Preignition time		
A´	Beginning of startup sequence with burners using an oil preheater	C	Operating position
A	Beginning of startup sequence with burners using no oil preheater	D	Controlled shutdown by «R»
B	Time of flame establishment	E	End of startup sequence
▬	Control signals	µC1	Microcontroller 1
▭	Required input signals	µC2	Microcontroller 2
▨	Permissible input signals		

Dimensions

Dimensions in mm

LMO64...



Color of plastic: Silver-grey (RAL7001)