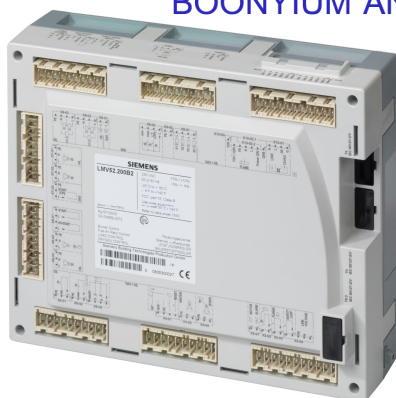


SIEMENS

Burner Management System

LMV5...

LMV50	Burner management system with integrated fuel / air ratio control and load control for use with forced draft burners. With specific functions for industrial applications.
LMV51	Burner management system with integrated fuel / air ratio control and load control for use with forced draft burners.
LMV52	Burner management system with integrated fuel / air ratio control and load control for use with forced draft burners including oxygen trim control.
The LMV5 and this Data Sheet are intended for use by OEMs which integrate the burner management systems in their products!	

Use

LMV5 is a microprocessor-based burner management system with matching system components for the control and supervision of forced draft burners of medium to high capacity.

Notes



Warning!

The safety, warning and technical notes given in the Basic Documentation on the LMV5 (P7550) apply fully to the present document also!

Based on the following software versions:

LMV50: V10.30
 LMV51: V05.20
 LMV51.3: V05.20
 LMV52.2...: V05.20
 LMV52.4: V10.30
 Int. LR module: V02.10
 Int. VSD module: V01.50
 AZL52: V05.10
 PLL52: V01.50
 CC1N7550en
 06.05.2024

Supplementary documentation

Product type	Product designation	Documentation type	Documentation number
ACS450	PC software	Operating instructions	J7550
AGQ1.xA27	UV ancillary unit	Data sheet	N7712
AZL52	Display and operating unit	User documentation	A7550
AZL52 / LMV51	Display and operating unit / burner management system	Operating instructions	U7550
AZL52 / LMV51	Display and operating unit / burner management system	Operating instructions	U7550.1
AZL52 / LMV52	Display and operating unit / burner management system	Operating instructions	U7550.2
AZL52 / LMV52	Display and operating unit / burner management system	Operating instructions	U7550.3
AZL52 / LMV50	Display and operating unit / burner management system	Operating instructions	U7550.4
AZL52 / LMV50	Display and operating unit / burner management system	Operating instructions	U7550.5
LMV5	Burner management system	Basic documentation	P7550
LMV52	Burner management system	User documentation (COx supervision and COx control)	A7550.5
LMV5	Burner management system	Setting list (parameter list and error code list)	I7550
LMV5	Burner management system	Installation guide	J7550.1
LMV5	Burner management system	Basic documentation	P7550
LMV5	Burner management system	Product range overview (this document contains a complete overview)	Q7550
OCI460	Cloud gateway	Data sheet	N7600
QRA2	UV flame detector	Data sheet	N7712
QRA4	UV flame detector	Data sheet	N7711
QRA7	UV flame detector	Data sheet	N7712
QRA10	UV flame detector	Data sheet	N7712
QRB1/QRB3	Photoresistive detector	Data sheet	N7714
QRI2	Infrared flame detector	Data sheet	N7719
QGO20	Oxygen sensor	Data sheet	N7842
QGO20	Oxygen sensor	Basic documentation	P7842
PLL52	O2 module	Basic documentation	P7550
SQM45/SQM48	Actuator	Data sheet	N7814
SQM9	Actuator	Data sheet	N7818



Note

This document only refers to the product type – not the product designation.



Applied directives:

- Low-voltage directive 2014/35/EC
- Directive for pressure devices 2014/68/EC
- Gas Appliances Regulation (EU) (EU) 2016/426
- Electromagnetic compatibility EMC (immunity) *) 2014/30/EC

*) The compliance with EMC emission requirements must be checked after the burner management system is installed in equipment

Compliance with the regulations of the applied directives is verified by the adherence to the following standards / regulations:

- Automatic burner control systems for burners and appliances burning gaseous or liquid fuels DIN EN 298
- Safety and control devices for burners and appliances burning gaseous and/or liquid fuels – Valve proving systems for automatic shut-off valves DIN EN 1643
- Safety and control devices for burners and appliances burning gaseous or liquid fuels – Control functions in electronic systems DIN EN 12067-2
Part 2:
Fuel/air ratio control/supervision of the electronic type
- Safety and control devices for burners and appliances burning gaseous and/or liquid fuels – General requirements DIN EN 13611
- Temperature control devices and temperature limiters for heat generating systems DIN EN 14597
- Safety and control devices for gas and/or oil burners and gas and/or oil appliances -- Particular requirements ISO 23552-1
Part 1: Fuel-air ratio controls, electronic type
- Automatic electrical controls for household and similar use DIN EN 60730-2-5
Part 2-5:
Particular requirements for automatic electrical burner control systems

The relevant valid edition of the standards can be found in the declaration of conformity!



Note on DIN EN 60335-2-102

Household and similar electrical appliances - Safety – Part 2-102:

Particular requirements for gas, oil, and solid-fuel burning appliances having electrical connections. The electrical connections of the LMV5 and the PLL52 comply with the requirements of DIN EN 60335-2-102.



EAC Conformity mark (Eurasian Conformity mark)



UKCA conformity mark (UK compliance)



China RoHS

Hazardous substances table:

<http://www.siemens.com/download?A6V10883536>

Standards and certificates (cont'd)

	Europe				Eurasian	America			Australia	United Kingdom
Type										
LMV50.320B2	●	●	●	●	●	---	---	---	●	●
LMV51.000C2	●	●	●	●	●	---	---	---	●	●
LMV51.040C1	●	---	---	●	●	●	●	●	●	---
LMV51.100C1	●	●	●	●	●	●	---	---	●	●
LMV51.100C2	●	●	●	●	●	---	---	---	●	●
LMV51.140C1	●	---	---	---	●	●	●	●	●	---
LMV51.300B1	●	●	●	●	●	●	---	---	●	●
LMV51.300B2	●	●	●	●	●	---	---	---	●	●
LMV51.340B1	●	---	---	---	●	●	●	●	●	---
LMV52.200B1	●	●	●	●	●	●	---	---	●	●
LMV52.200B2	●	●	●	●	●	---	---	---	●	●
LMV52.240B1	●	---	---	●	●	●	●	●	●	---
LMV52.240B2	●	---	---	●	●	---	---	---	●	---
LMV52.400B2	●	●	●	●	●	---	---	---	●	●
LMV52.440B1	●	---	---	---	●	●	●	●	●	---

	Ships	
Type		
LMV50.320B2	●	●
LMV51.000C2	●	●
LMV51.040C1	●	---
LMV51.100C1	●	●
LMV51.100C2	●	●
LMV51.140C1	●	---
LMV51.300B1	●	●
LMV51.300B2	●	●
LMV51.340B1	●	---
LMV52.200B1	●	●
LMV52.200B2	●	●
LMV52.240B1	●	---
LMV52.240B2	●	---
LMV52.400B2	●	●
LMV52.440B1	●	---

Standards and certificates (cont'd)

	Europe				Eurasian	America			Australia	United Kingdom
Type										
LMV5 system components:										
AZL52	●	●	●	●	●	●	●	●	●	●
QGO20	●	●	●	●	●	●	●	●	●	●
QRA7	●	●	●	●	●	●	●	●	●	●
QRB1/QRB3	●	●	●	●	●	---	●	●	●	●
QRI2	●	●	●	●	●	●	●	●	●	●
PLL52	●	●	●	●	●	●	●	●	●	●
SQM45/SQM48	●	●	●	●	●	●	●	●	●	●
SQM9	●	●	●	●	●	●	●	●	●	●

	Ships	
Type		
LMV5 system components:		
AZL52	●	●
QGO20	---	---
QRA7	●	●
QRB1/QRB3	●	●
QRI2	●	●
PLL52	---	●
SQM45/SQM48	●	●
SQM9	---	---



Note!

When using the LMV5 in Australia, we strongly recommend that you use a *BASE PAR GAS.par* file to adapt the parameter set to the specific requirements of the Australian market. Please direct any queries to Siemens Australia.



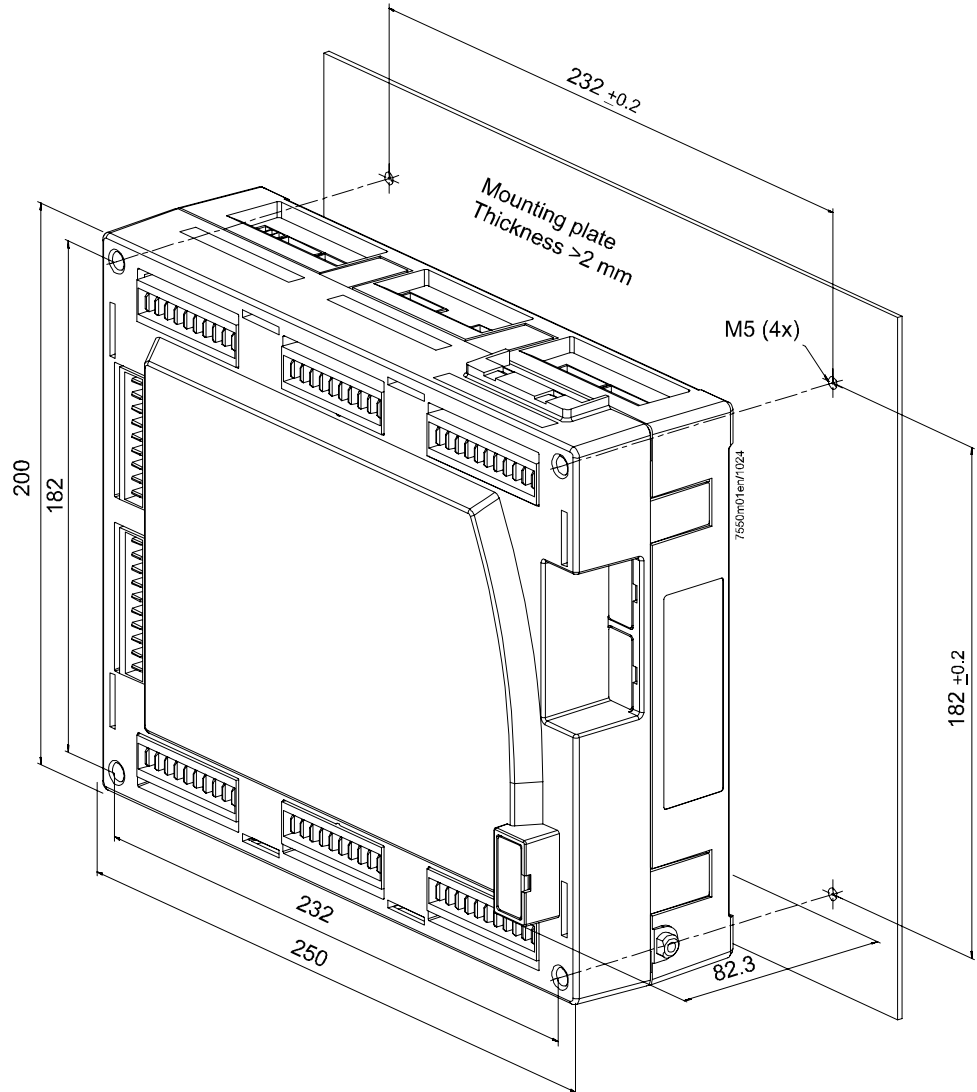
Note!

With regard to the use of the LMV5 in safety-related systems up to SIL3, a manufacturer's declaration from Siemens AG is available.

Mounting notes

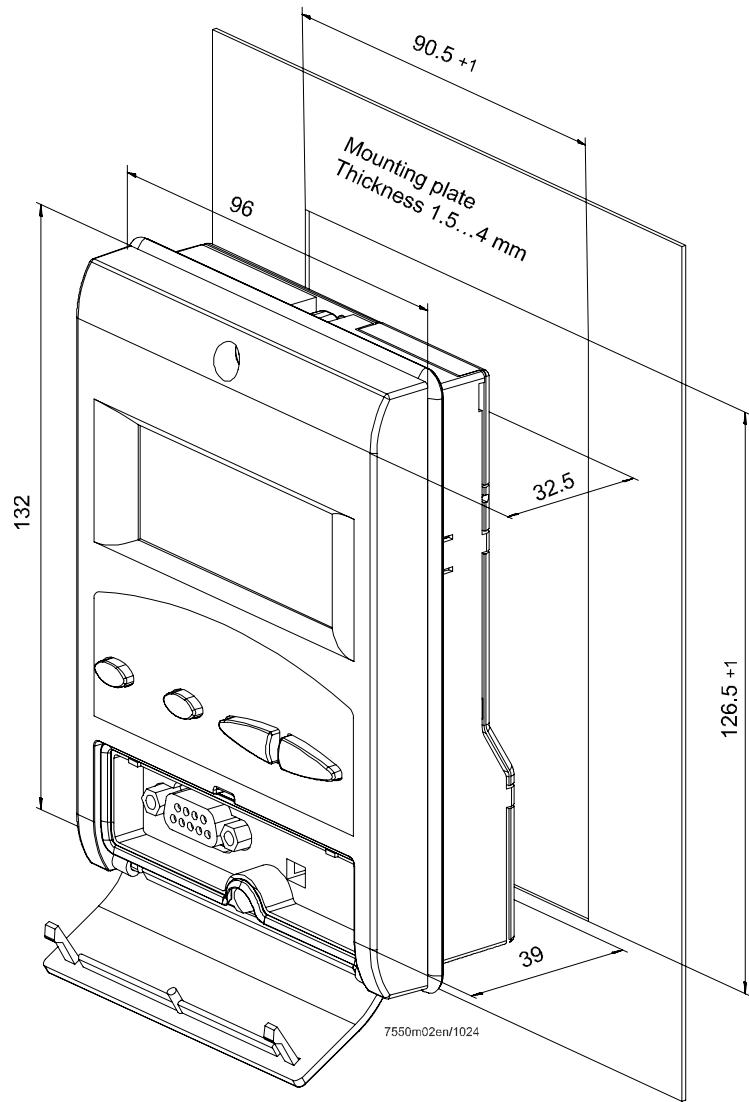
- Ensure that the relevant national safety regulations are complied with
- In the geographical areas where DIN regulations are in use, the requirements of VDE must be satisfied, especially DIN/VDE 0100, 0550 and DIN/VDE 0722
- M5 fixing screws in LMV5 housing with maximum tightening torque of 2 Nm. The thread of the mounting plate should be checked or defined accordingly with regard to the maximum tightening torque in the application.

LMV5 installation notes



Mounting notes (continued)

AZL52 installation notes



Life cycle

The burner control has a designed lifetime* of 250,000 burner startup cycles which, under normal operating conditions in heating mode, corresponds to approx. 10 years of service (starting from the date of manufacture on the type label). This is based on the continuous tests specified in standards EN 298. A summary of the conditions has been published by the European Control Manufacturers Association (Afecor - www.afecor.org).

The designed lifetime is based on use of the LMV5 according to the manufacturer's Data Sheet and Basic Documentation. After reaching the designed lifetime in terms of the number of burner startup cycles, or the respective time of usage, the LMV5 is to be replaced by authorized personnel.

* The designed lifetime is not the warranty time specified in the Terms of Delivery



Notes

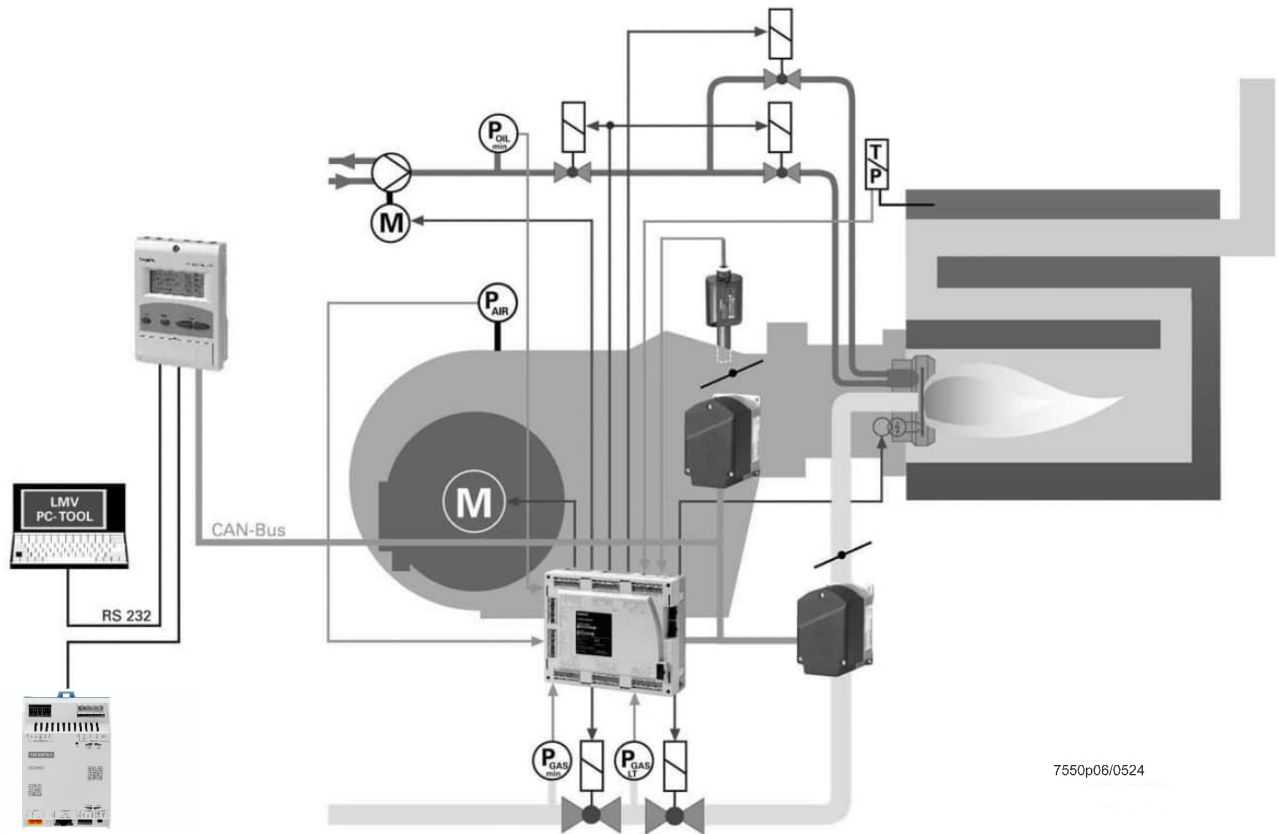
The total start counter is incremented with each burner start cycle. This also happens if a start attempt is aborted. For details, refer to chapter 'Lifecycle function' in the LMV5 Basic Documentation (P7550).

Disposal notes

The LMV5 contains electrical and electronic components and must not be disposed of together with domestic waste. Local and currently valid legislation must be observed.

The following components are integrated in the LMV5:

- Burner control with gas valve proving system
- Electronic fuel-air ratio control for:
 - A maximum of 4 actuators for LMV50 / LMV51
 - A maximum of 6 actuators for LMV52
- Optional PID temperature or pressure controller (boiler controller / load controller)
- Optional VSD module



7550p06/0524

Example:

Dual-fuel burner

- Gas: Modulating
- Oil: 2-stage

The system components (AZL52, SQM4x/SQM9, PLL52) are interconnected via a bus system. Communication between the bus users takes place via a safety-related, system-bound data bus (for safety reasons, integration of the bus into external CAN bus systems is not possible). All safety-related digital outputs of the system are permanently monitored via a contact feedback network. For flame supervision in connection with the LMV5, the QRI/QRA7 or an ionization probe can be used for continuous operation, while the QRB1/QRB3/QRA2/QRA4/QRA10 optical detectors with AGQ1.xA27 (230 V~) are suitable for intermittent operation.

The LMV5 is operated and programmed via the AZL52 or ACS450. The AZL52 features an LCD plain text display and menu-driven operation, offering straightforward operation and targeted diagnostics. For making diagnostics, the LCD shows the operating states, the type of fault and the point in time the fault occurred. The parameter setting levels for the burner / boiler manufacturer and heating engineer are password-protected to prevent unauthorized access. Basic settings that the plant operator can make on site do not require a password. The AZL52 also serves as an interface to higher-level systems such as building automation (GA) or to a PC using the ACS450. Among other features, the unit affords convenient readout of settings and operating states, parameterization of the LMV5, and trend recording. When replacing the LMV5, all parameters can be saved in a backup memory of the AZL52 and then restored to the new LMV5. This means that reprogramming is not required.

When designing the fuel trains, the burner / boiler manufacturer can choose from a total of 7 valve families. The large number of individual parameterization choices (program times, configuration of inputs / outputs, etc.) enable him to make optimum adaptations to the specific application.

The SQM4x / SQM9s are driven by stepper motors and offer high-resolution positioning. Relevant characteristics and settings of the SQM4x/SQM9s are determined by the LMV5.

Type reference

Article no.	Type reference	Mains voltage	Parameter set	Max. number of actuators	Automatic adaptation of controller's characteristics	Limit thermostat	Fuel meter input	Integrated gas valve proving	Integrated PID load controller	Control of VSD	Analog output	O2 trim control	**) Safety time TSAmax.	
													Gas	Oil
BPZ:LMV50.320B2	LMV50.320B2	230 V~	LMV50	5 *)	●	●	●	●	●	●	●	---	10 s	15 s
BPZ:LMV51.000C2	LMV51.000C2	230 V~	Europe	4	---	---	---	●	---	---	---	---	10 s	15 s
BPZ:LMV51.040C1	LMV51.040C1	120 V~	US / Canada	4	---	---	---	●	---	---	---	---	10 s	15 s
BPZ:LMV51.100C1	LMV51.100C1	120 V~	Europe	4	●	●	---	●	●	---	●	---	10 s	15 s
BPZ:LMV51.100C2	LMV51.100C2	230 V~	Europe	4	●	●	---	●	●	---	●	---	10 s	15 s
BPZ:LMV51.140C1	LMV51.140C1	120 V~	US / Canada	4	●	●	---	●	●	---	●	---	10 s	15 s
BPZ:LMV51.300B1	LMV51.300B1	120 V~	Europe	5 *)	●	●	●	●	●	●	●	---	10 s	15 s
BPZ:LMV51.300B2	LMV51.300B2	230 V~	Europe	5 *)	●	●	●	●	●	●	●	---	10 s	15 s
BPZ:LMV51.340B1	LMV51.340B1	120 V~	US / Canada	5 *)	●	●	●	●	●	●	●	---	10 s	15 s
BPZ:LMV52.200B1	LMV52.200B1	120 V~	Europe	6	●	●	●	●	●	●	●	●	10 s	15 s
BPZ:LMV52.200B2	LMV52.200B2	230 V~	Europe	6	●	●	●	●	●	●	●	●	10 s	15 s
BPZ:LMV52.240B1	LMV52.240B1	120 V~	US / Canada	6	●	●	●	●	●	●	●	●	10 s	15 s
BPZ:LMV52.240B2	LMV52.240B2	230 V~	US / Canada	6	●	●	●	●	●	●	●	●	10 s	15 s
BPZ:LMV52.400B2	LMV52.400B2	230 V~	Europe	6	●	●	●	●	●	●	●	●	10 s	15 s
BPZ:LMV52.440B1	LMV52.440B1	120 V~	US / Canada	6	●	●	●	●	●	●	●	●	10 s	15 s

*) When the VSD module is activated, only 4 SQM4x/SQM9 actuators can be controlled!

**)



Attention!

The maximum safety time in the parameter set is set as follows ex works:

Parameter set	Gas	Oil
LMV50	10 s	10 s
Europe	3 s	5 s
US / Canada	10 s	15 s

On the OEM access level, it is possible to make parameter settings that differ from application standards. For this reason, check whether the parameter settings made are in compliance with the application standards (e.g. EN 676, EN 267, etc.), or whether the respective plant requires special approval!

Technical data

LMV5

Mains voltage

AC 120 V
-15% / +10%

AC 230 V
-15% / +10%



Note!
Only for use in earthed networks!

Transformer	AGG5.210	AGG5.220
- Primary side	AC 120 V	AC 230 V
- Secondary side 1	12 V~	12 V~
- Secondary side 2	2 x 12 V~	2 x 12 V~
Mains frequency	50 / 60 Hz $\pm 6\%$	50 / 60 Hz $\pm 6\%$
Power consumption	<30 W (typically)	<30 W (typically)
Safety class	I, with parts according to II and III to EN 60730-1:2016 + A1:2019	
Degree of protection of housing	IP00 according to EN 60529:1991 + A1:2000 + A2:2013 The burner or boiler manufacturer must ensure degree of protection IP40 according to EN 60529:1991 + A1:2000 + A2:2013 through adequate installation of the LMV5	
Mode of operation	Type 2B in accordance with EN 60730-1:2016	
Rated surge voltage	Rated surge voltage in accordance with EN 60730-1:2016 + A1:2019, chapter 20 (OC III)	
Mains voltage and power supply for EMC emitted interference tests	The emitted interference measurement test takes place with mains voltage and maximum power consumption	

Technical data (cont'd)

Terminal loading «Inputs»

General data

Mains voltage	120 V~ -15% / +10%	230 V~ -15% / +10%
• Permissible primary fuse (Si) (external)	Max. 16 AT	Max. 16 AT



Caution!

Risk of damage to the switching contacts!

If the external primary fuse (Si) is blown due to overload or short-circuit at the terminals, the LMV5 must be replaced.

• Unit fuse F1 (internally)	6.3 AT to DIN EN 60127-2	6.3 AT to DIN EN 60127-2
• Mains supply: Input current depending on operating state of the unit		
Undervoltage		
• Safety shutdown from operating position at mains voltage	<96 V~	<186 V~
• Restart on rise in mains voltage	>100 V~	>188 V~
Oil pump / magnetic clutch (nominal voltage)		
• Nominal current	1,6 A	2 A
• Power factor	Cosφ >0.4	Cosφ >0.4
Air pressure switch test valve (nominal voltage)		
• Nominal current	0.5 A	0.5 A
• Power factor	Cosφ >0.4	Cosφ >0.4
Status inputs (KRN): Status inputs (with the exception of the safety loop) of the contact feedback network (CFN) are used for system supervision and require mains-related input voltage		
• Input safety loop	Refer to «Terminal loading outputs»	
• Input currents and input voltages		
- UeMax	UN +10%	UN +10%
- UeMin	UN -15%	UN -15%
- IeMax	1.5 mA peak	1.5 mA peak
- IeMin	0.7 mA peak	0.7 mA peak
• Contact material recommendation for external signal sources (LP, DWmin, DWmax, etc.)	Gold-plated silver contacts	
• Transition / settling behavior / bounce		
- Perm. bounce time of contacts when switching on / off	Max. 50 ms (after the bounce time, the contact must stay closed or open)	
• UN	AC 120 V	AC 230 V
• Voltage detection		
- On	90...132 V~	180...253 V~
- Off	<40 V~	<80 V~

Technical data (cont'd)

Terminal loading «Outputs»

Total contact loading: (nominal voltage)

	AC 120 V -15 % / +10 %	AC 230 V -15 % / +10 %
<ul style="list-style-type: none"> Unit input current (safety loop) total contact current from: <ul style="list-style-type: none"> - Fan motor contactor - Ignition transformer - Valves - Oil pump / magnetic clutch 	Max. 5 A	Max. 5 A

Individual contact loading:

Fan motor contactor

	AC 120 V	AC 230 V
• Nominal voltage	1 A	1 A
• Nominal current	Cosφ >0.4	Cosφ >0.4

Alarm output (nominal voltage)

• Nominal current	1 A	1 A
• Power factor	Cosφ >0.4	Cosφ >0.4

Ignition transformer (nominal voltage)

• Nominal current	1.6 A	2 A
• Power factor	Cosφ >0.2	Cosφ >0.2

Gas valves-gas (nominal voltage)

• Nominal current	1.6 A	2 A
• Power factor	Cosφ >0.4	Cosφ >0.4

Oil valves-oil (nominal voltage)

• Nominal current	1.6 A	1 A
• Power factor	Cosφ >0.4	Cosφ >0.4

Cable lengths

• Mains line	Max. 100 m (100 pF/m)	Max. 100 m (100 pF/m)
• HCFN line	Max. 100 m (100 pF/m) ¹⁾	Max. 100 m (100 pF/m) ¹⁾
• Analog line	Max. 100 m (100 pF/m)	Max. 100 m (100 pF/m)
• Flame detector	Refer to chapter «Technical Data / Flame supervision»	
• CAN bus	Total lengths max. 100 m	



Note!

¹⁾ If the cable length exceeds 50 m, no additional loads may be connected to the status inputs, refer to chapter 'Power supply for the LMV5' in the LMV5 Basic Documentation (P7550)!

Above a certain cable length, the actuators must be powered by a separate transformer installed near the actuators.

Technical data (cont'd)

Cross-sectional areas

The cross-sectional areas of the mains power lines (L, N, PE) and, if required, the safety loop (safety limit thermostat, water shortage, etc.) must be sized for nominal currents according to the selected external primary fuse. The cross-sectional areas of the other cables must be sized in accordance with the internal unit fuse (max. 6.3 AT).

Min. cross-sectional area	0.75 mm ² (single- or multi-core to VDE 0100)
---------------------------	---

Cable insulation must meet the relevant temperature requirements and conform to the environmental conditions. The CAN (bus) cables have been specified by Siemens and can be ordered as accessory items. **Other cables must not be used. If this is not observed, the EMC characteristics of the LMV5 will be unpredictable!**

Nominal voltage	AC 120 V -15 % / +10 %	AC 230 V -15 % / +10 %
Fuses used in the LMV5		
- F1	6.3 AT DIN EN 60127-2	6.3 AT DIN EN 60127-2
- F2	4 AT GMD-4A	4 AT DIN EN 60127-2
- F3	4 AT GMD-4A	4 AT DIN EN 60127-2

AZL52

Operating voltage	24 V~ -15 % / +10 %
Power consumption	<5 W (typically)
Degree of protection of housing	
• Rear	IP00 to EN 60529:1991+A1:2000 + A2:2013
• Front	IP54 to EN 60529:1991+A1:2000 + A2:2013 when installed
Safety class	I, with parts according to II and III to DIN EN 60730-1
Battery:	
Supplier	Type reference
VARTA	CR 2430 (LF-1/2 W)
DURACELL	DL 2430
SANYO ELECTRIC, Osaka / Japan	CR 2430 (LF-1/2 W)
RENATA AG, Ittingen / CH	CR 2430
Pollution degree	2

Technical data (cont'd)

PLL52

Mains voltage «X89-01»	AC 120 V -15 % / +10 %	AC 230 V -15 % / +10 %
Safety class	I, with parts according to II to EN 60730-1:2016 + A1:2019	
Mains frequency	50 / 60 Hz ±6%	50 / 60 Hz ±6%
Power consumption	Approx. 4 VA	Approx. 4 VA
Degree of protection	IP54, housing closed	

Cable lengths / cross-sectional areas:

- Electrical connection «X89» Screw terminals up to 2.5 mm²
- Cable lengths ≤10 m to QGO20
- Cross-sectional areas Refer to QGO20 description, twisted pairs

Analog inputs:

- Supply air temperature sensor Pt1000 / LG-Ni1000
- Flue gas temperature sensor Pt1000 / LG-Ni1000
- QGO20 Refer to Data Sheet N7842
- Interface Communication bus for LMV52

AGG5.2x0

Transformer AGG5.210	
• Primary side	AC 120 V
• Secondary side	12 V~ (3x)
Transformer AGG5.220	
• Primary side	AC 230 V
• Secondary side	12 V~ (3x)

CAN bus cable

Cable types:	
AGG5.641	8 mm dia. +0,5 / -0,2 mm Bending radius ≥120 mm Ambient temperature -30...+70 °C (no movements of cable) Cable is resistant to almost all types of mineral oil
AGG5.631	7.5 mm dia. ±0.2 mm Bending radius ≥113 mm Ambient temperature -30...+70 °C (no movements of cable) Cable is resistant to almost all types of mineral oil

Technical data (cont'd)

Environmental conditions (all LMV5 components)

Storage

Climatic conditions
Mechanical conditions
Temperature range
Humidity

EN 60721-3-1:1997
Class 1K3
Class 1M2
-20...+60 °C
<95% r.h.

Transport

Climatic conditions
Mechanical conditions
Temperature range
Humidity

EN 60721-3-2:1997
Class 2K2
Class 2M2
-20...+60 °C
<95% r.h.

Operation

Climatic conditions
Mechanical conditions
Temperature range
Humidity
Installation altitude

EN 60721-3-3:1995 + A2:1997
Class 3K3
Class 3M3
-20...+60 °C
<95% r.h.
Max. 2,000 m above sea level



Caution!

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

Flame supervision

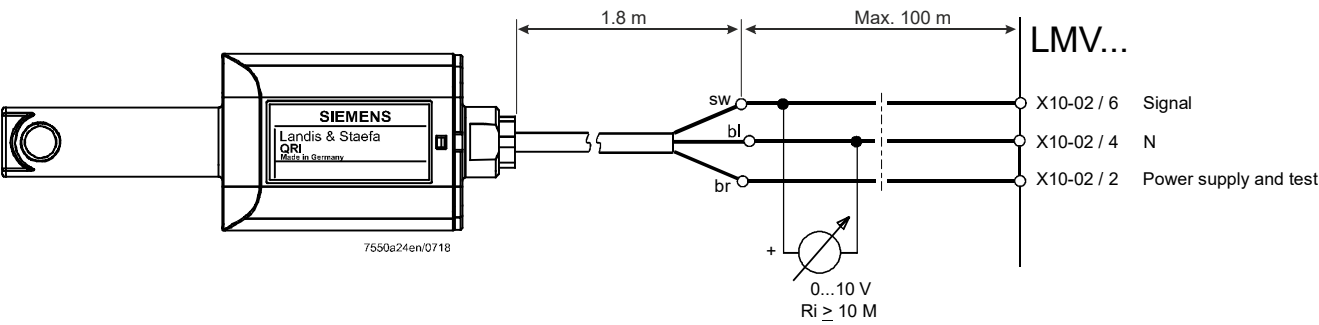


Note:
All measured voltages refer to connection terminal N (X10-02, pin 4).

QRI (suited for continuous operation)

Supply voltage operation/test at the 'Power QRI' input (terminal X10-02 pin 2)	Approx. DC 14 / 21 V
Required signal voltage at the 'FSV/QRI' input (terminal X10-02 pin 6)	Min. DC 3,5 V Display flame approx. 50 % (with factory setting of the 'StandardFactor' parameter)
Permissible signal voltage during extraneous light test	Max. 0.3 V DC
Possible signal voltage at the 'FSV/QRI' input (terminal X10-02 pin 6)	Max. 5.5 V DC Display flame approx. 100% (with factory setting of the 'StandardFactor' parameter)

Connection diagram



For detailed information, refer to Data Sheet N7719.

Technical data (cont'd)

IONIZATION (suited for continuous operation)

No-load voltage at the 'ION' input
(terminal X10-03 pin 1)

Approx. U_{Mains}



Caution!

The ionization probe must be installed such that protection against electrical shock hazard is ensured!

Short-circuit current	Max. 0,5 mA~
Required detector current	Min. DC 6 μ A Display flame approx. 50 % (at factory setting of <i>StandardFactor</i> parameter)
Possible detector current	Max. DC 85 μ A Display flame approx. 100 % (at factory setting of <i>StandardFactor</i> parameter)
Permissible detector current during extraneous light test	Max. 0.3 μ A DC
Permissible length of detector cable (lay separately)	100 m (wire-earth 100 pF/m)



Note!

The greater the detector cable capacitance (cable length), the lower the voltage at the ionizations probe and, therefore, the lower the detector current. In the case of extensive cable lengths and high-resistance flames, it may be necessary to use low-capacitance cables (e.g. ignition cable). The electronic circuit is designed such that impacts of the ignition spark on the ionization current will be largely eliminated. Nevertheless, it must be ensured that the minimum detector current required will already be reached during the ignition phase. If this is not the case, the polarity of the primary ignition transformer connection must be reversed and/or the electrodes relocated.

Threshold values when flame is supervised by ionization

- | | |
|---------------------------------------|-----------------------------|
| • Start prevention (extraneous light) | Flame intensity $\geq 18\%$ |
| • Operation | Flame intensity $> 24\%$ |

Technical data (cont'd)

Ionization current supervision for 120 V AC burner controls

Since the ionization current with 120 V AC burner controls is only about 50% of those operating on 230 V AC, certain applications make it necessary to increase the ionization current with a transformer.

A5Q20002669 transformer

Article no.: **BPZ:A5Q20002669**

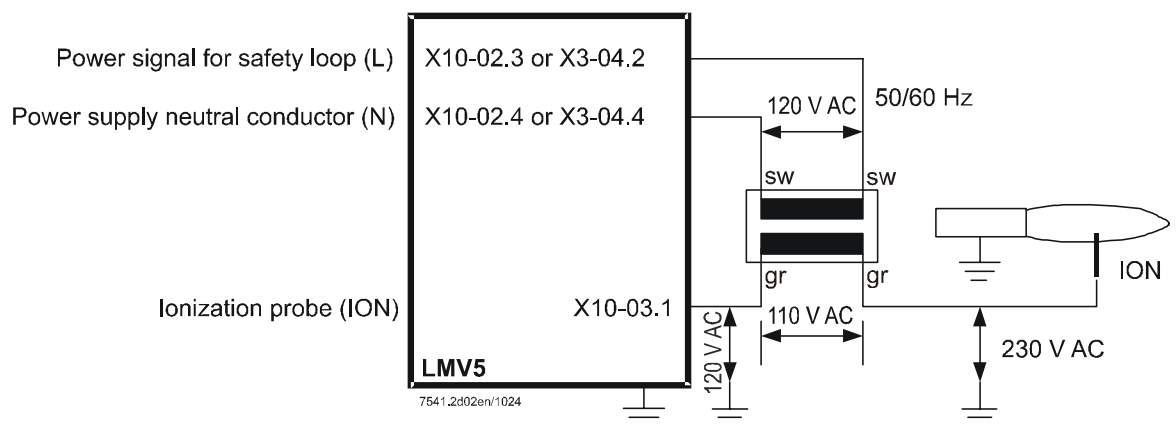
Transformer (V 19734) to increase ionization voltage for 120 V AC units



Function

Flame supervision is accomplished by making use of the conductivity and rectifying effect of hot flame gases. For that purpose, AC voltage is applied to the heat-resistant ionization probe that projects into the flame. The current that flows in the presence of a flame (ionization current) generates the flame signal that is fed to the input of the flame signal amplifier. This is designed to respond exclusively to the DC component of the flame signal, thereby ensuring that a short-circuit between ionization probe and ground cannot simulate a flame signal (since AC would flow in this case).

When the transformer is connected in series with the ionization probe, the electrode voltage at the probe is increased by the transformed secondary voltage of the transformer. This results in a higher ionization current with the same flame resistance. The evaluation of ionization current supervision is maintained. The transformer causes a symmetrical increase in the electrode voltage.



Key

Jacket color:

gr Gray

sw Black

Note



If a voltage of 230 V AC is not reached at the ionization probe, the polarity of the primary electrical connection of the transformer must be reversed. This means that terminal X3-04 pin 2 must be swapped with terminal X3-04 pin 4.

Ionization current supervision for 120 V AC burner controls

Transformer specifications

- Reinforced or double insulation in accordance with DIN EN 61558-2-6 or DIN EN 61558-2-17
- Fuse fitted on the primary side via the LMV5
- The maximum secondary voltage must not exceed 230 V AC (adherence to air gaps and creepage distances in the event of a detector short-circuit)
- Recommended transformer load: 0.5...2 VA
- Transformer and cable connections must be suitable for the maximum AC voltages that can occur

Safety notes

- For operation with increased voltage, the symmetry of the mains supply voltage must be checked
- Operation should only take place if the limit values in accordance with EN 50160 ($\leq 2\%$) are observed
- The type of transformer used must meet the requirements of subsection 'Transformer specifications', since faulty insulation in combination with asymmetrical mains networks can lead to a flame simulation.

Flame supervision

**QRA2 / QRA4 / QRA10
with AGQ1.xA27**

For intermittent operation only.



Note!
AGQ1.xA27 is only available for AC 230 V mains voltage.



Notes
Lifetime of the UV cell
UV cells and the QRA2/QRA4/QRA10 are subject to wear and tear and must be replaced as part of regular maintenance, at the latest at the end of the average lifetime of the UV cell. The lifetime of the UV cell corresponds to approx. 10,000 hours at a maximum of +50°C; higher ambient temperatures reduce the lifetime considerably. For details, refer to chapter 'Technical data' in Data Sheet N7712 for the QRA2/QRA10. For details, refer to chapter 'Technical data' in Data Sheet N7711 for the QRA4.

QRA2/QRA4/QRA10

Power supply in operation	DC 280...325 V
Power supply in test mode	DC 350...450 V

For more detailed information about QRA2 / QRA10, refer to Data Sheet N7712.
For more detailed information about QRA4, refer to Data Sheet N7711.



Caution!
The QRA2/QRA4/QRA10 must not be used if extraneous light suppression is set ('ExtranLightTest' parameter = deactivated), as detector tests will not be carried out in that case.

LMV5

Possible ionization current	Max. 10 µA Display flame approx. 100% (with factory setting of the 'StandardFactor parameter)
Ionization current required	Min. 6 µA Display flame approx. 50% (with factory setting of the 'StandardFactor' parameter)
Permissible ionization current during extraneous light test	Max. 0.3 µA DC

Flame supervision

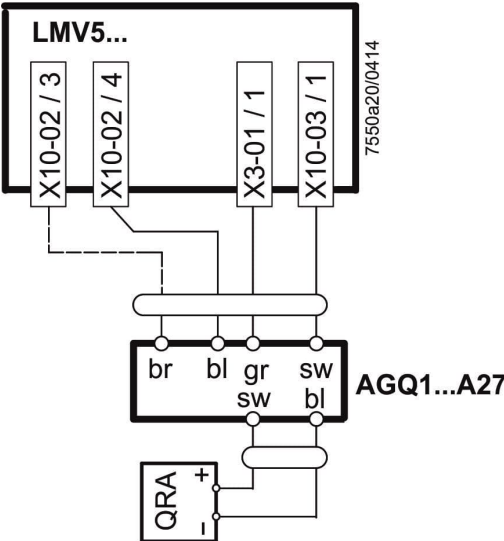
**QRA2 / QRA4 / QRA10
with AGQ1.xA27**

AGQ1.xA27

Use of the AGQ1.xA27 is mandatory in connection with the LMV5.

Power supply	AC 230 V
Possible current	Max. 500 µA
Current required	Min. 200 µA

Connection diagram



Assignment of LMV5 terminals:

X10-02 pin 3	L
X10-02 pin 4	N
X10-03 pin 1	Ionization
X3-01 pin 1	Fan

Code of color

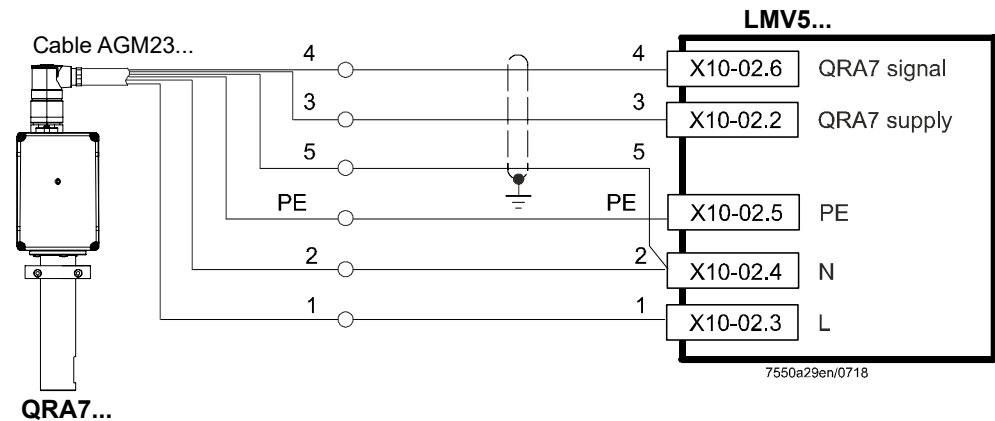
br = brown
bl = blue
sw = black
gr = grey (old: rt = red)

When laid together with other cables (e.g. in a cable duct), the length of the 2-core cable between QRA2 / QRA4 / QRA10 and AGQ1.xA27 must not exceed 20 m. A maximum cable length of 100 m is permitted if the 2-core cable is run at a distance of at least 5 cm from other live cables. The length of the 4-core cable between AGQ1.xA27 and LMV5 is limited to 20 m. A maximum cable length of 100 m is permitted if the signal line (ionization / black) is not run in the same cable but separately at a distance of at least 5 cm from other live cables.

Flame supervision

QRA7 (suited for continuous operation)	Power supply	
	- QRA73A17 / QRA75A17	AC 120 V
	- QRA73A27 / QRA75A27	AC 230 V
	Power supply for test via increasing the power supply for QRA7 (X10-02 pin 2)	From DC 14 V up to DC 21 V
	Required signal voltage (X10-02 pin 6)	Min. DC 3.5 V Display flame approx. 50% (with factory setting of the 'StandardFactor' parameter)
	Possible signal voltage (terminal X10-02 pin 6)	Max. 5.5 V DC Display flame approx. 100% (with factory setting of the 'StandardFactor' parameter)
	Permissible signal voltage during the extraneous light test (terminal X10-02 pin 6)	Max. 0.3 V DC
	Perm. length of detector cable	
	• 6 wire cable	Max. 10
	• Signal cable no. 3, 4 and 5	Max. 100 m (lay separately from L, N and PE in shielded cable)

Connection diagram



For more detailed information about QRA7, refer to Data Sheet N7712.

Flame supervision

QRB1/QRB3 (for intermittent operation only)

No-load voltage at the 'QRB1/QRB3' input (terminal X10-02 pin 1)	Approx. DC 8 V
Detector current required (with flame)	Min. DC 30 µA Display flame 35 % (at factory setting of <i>StandardFactor</i> parameter)
Permissible detector current (dark current with no flame)	Max. DC 5 µA
Permissible detector current	Max. DC 70 µA Display flame approx. 100 % (at factory setting of <i>StandardFactor</i> parameter)
Permissible length of QRB1/QRB3 detector cable (lay separately)	100 m (wire-wire 100 pF/m) For cable lengths >10 m, use a shielded cable and connect the shield to PE at one end.



Note!

A detector resistance value of $R_F < 5 \text{ k}\Omega$ is identified as a short-circuit and, in operation, will lead to safety shutdown as if loss of flame had occurred. Measurement of the voltage at the 'QRB1/QRB3' input during burner operation provides a clear indication: If voltage drops below 1 V, safety shutdown will probably occur. For that reason, before using a highly sensitive photoresistive flame detector (QRB1B, QRB3S), it should be checked whether such a detector is really required! Increasing line capacitance between the QRB1B, QRB3S terminal and mains live «L» adversely affects the sensitivity and increases the risk of damaged flame detectors due to mains overvoltages. Separate routing of detector cables as specified in Data Sheet 7714 must be observed.

For more detailed information, refer to Data Sheet N7714.



Caution!

Flame detectors QRB1/QRB3 must not be used when extraneous light suppression is activated since detector tests are not made in that case (parameter *ExtranLightTest* = deactivated)!



Caution!

Observe the relevant standards and regulations (e.g. extra supervision of the combustion chamber temperature)!

Flame display via AZL52

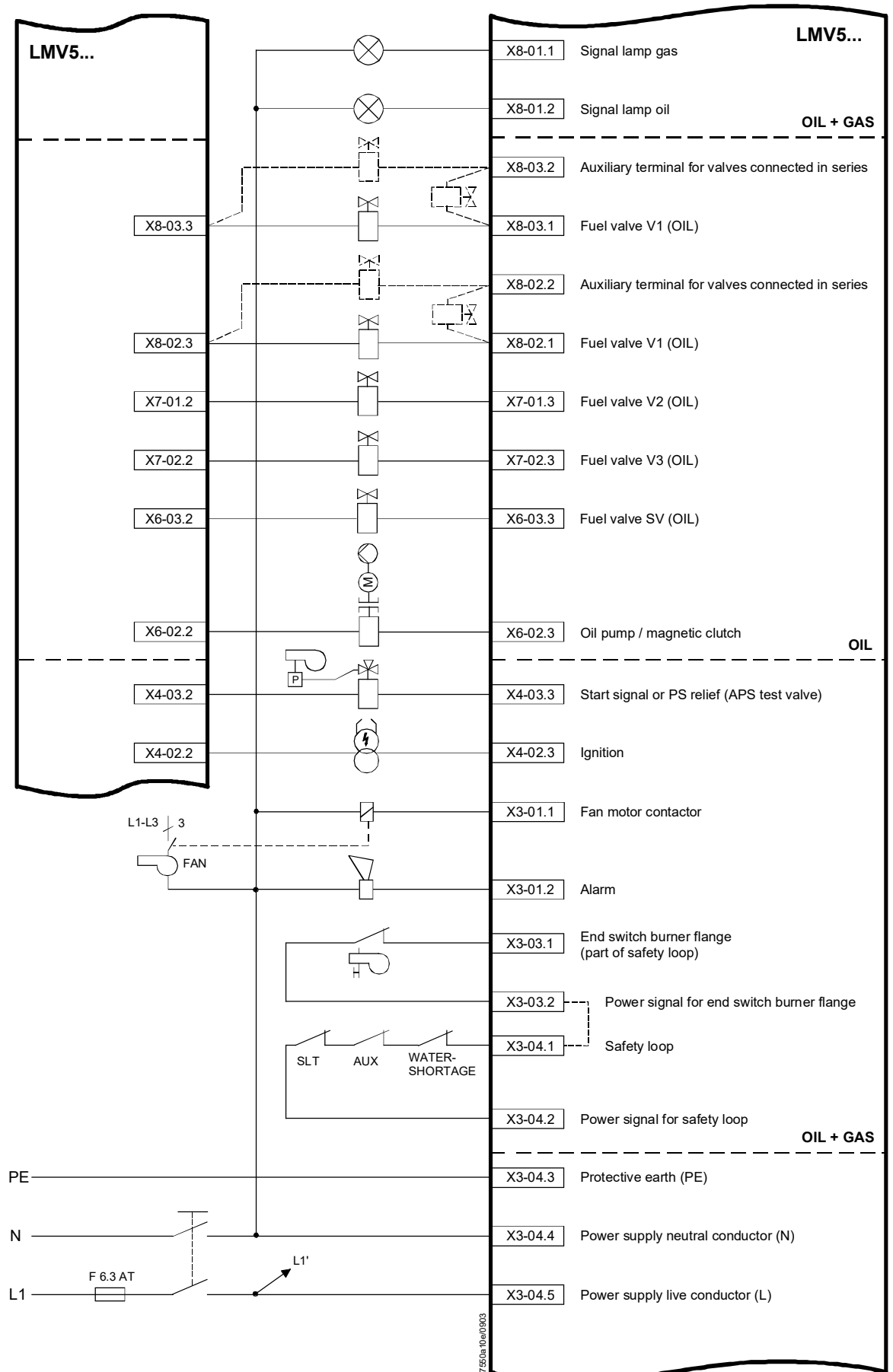
For the flame signal display on the AZL52, the following general conditions apply: The percentages values listed above result from the factory setting of the parameter *Standardize* (standardization of flame signal display). The display is subject to various component tolerances, with the result that deviations of $\pm 10 \%$ are perfectly possible. It should furthermore be noted that for physical reasons, there is no linear connection between the display and detector signal values. This is especially apparent in supervision of ionization.

Flame supervision

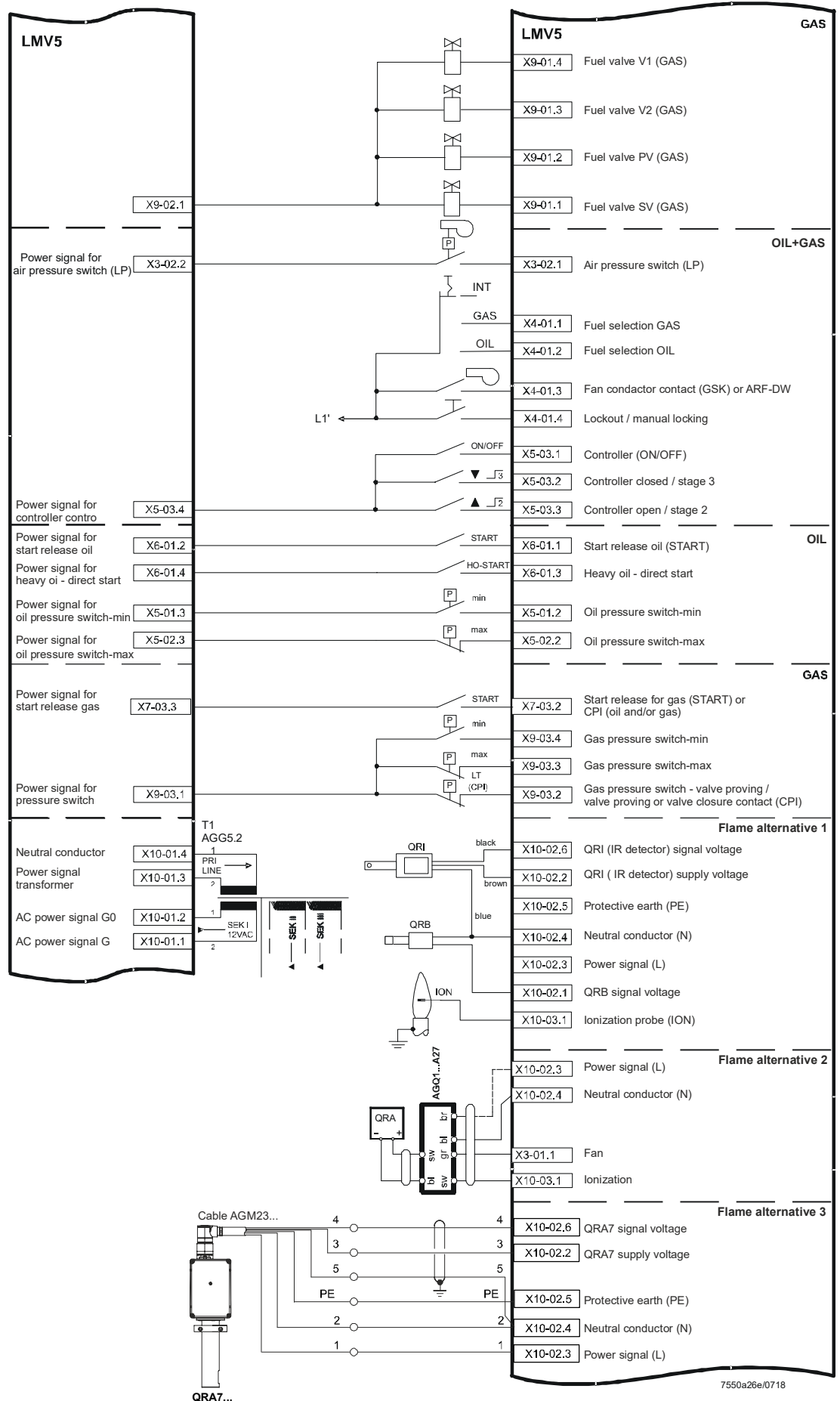
External flame
supervision
(LMV50/LMV52)

Flame supervision can be carried out using an external, approved (fail-safe/self-checking) flame safeguard. The external flame safeguard must provide the flame signal (mains voltage ON/OFF) by means of a switching contact. The flame signal is evaluated at the LMV5 input, terminal X6-01 pin 3 (parameter 'HeavyOilDirStart'). To do this, it must be configured to 'ext.FlameGd'. A mains voltage signal at the input leads to a flame signal. The complete system is only suitable for continuous operation if the external flame safeguard used is approved for continuous operation.

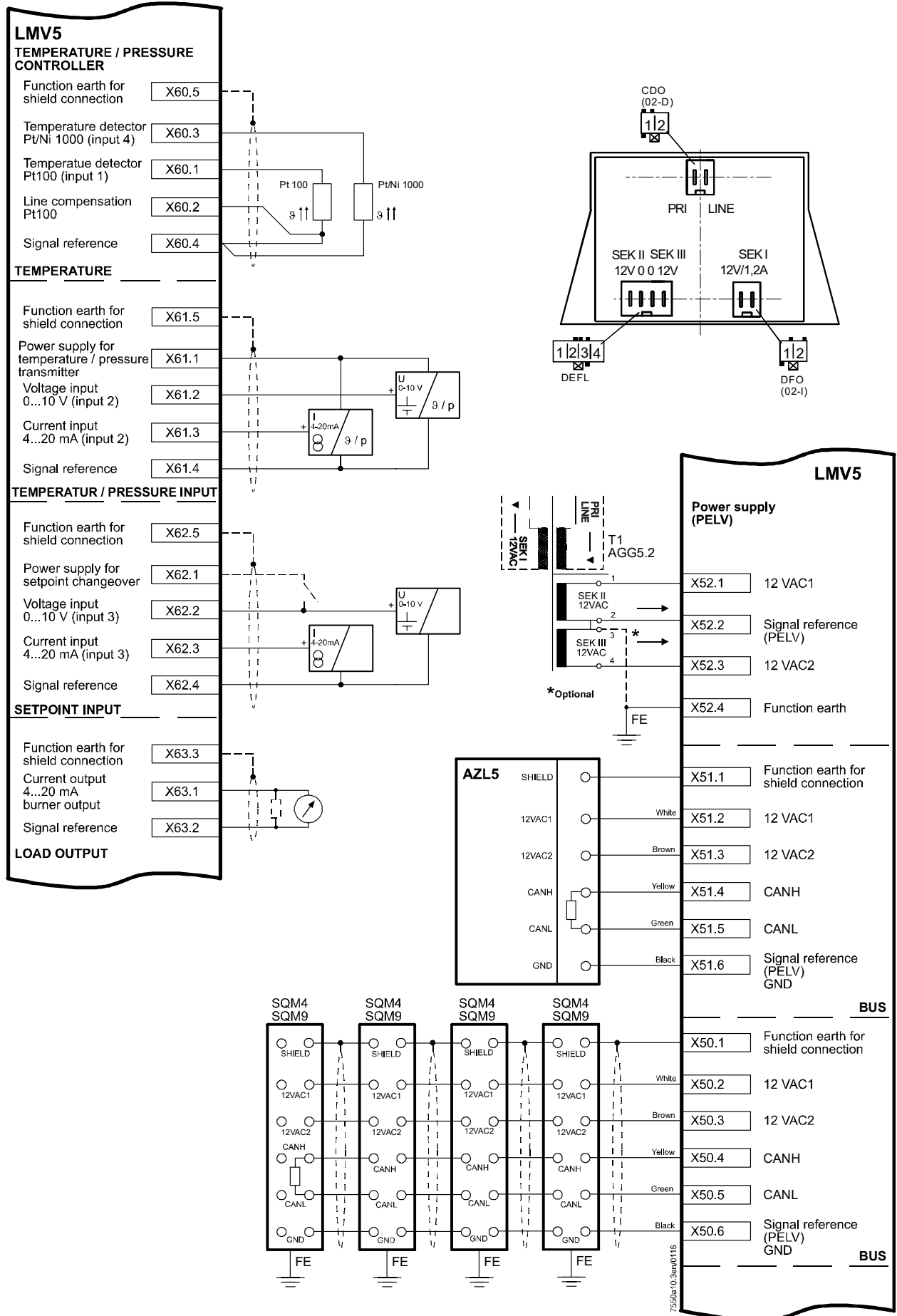
Block diagram inputs / outputs



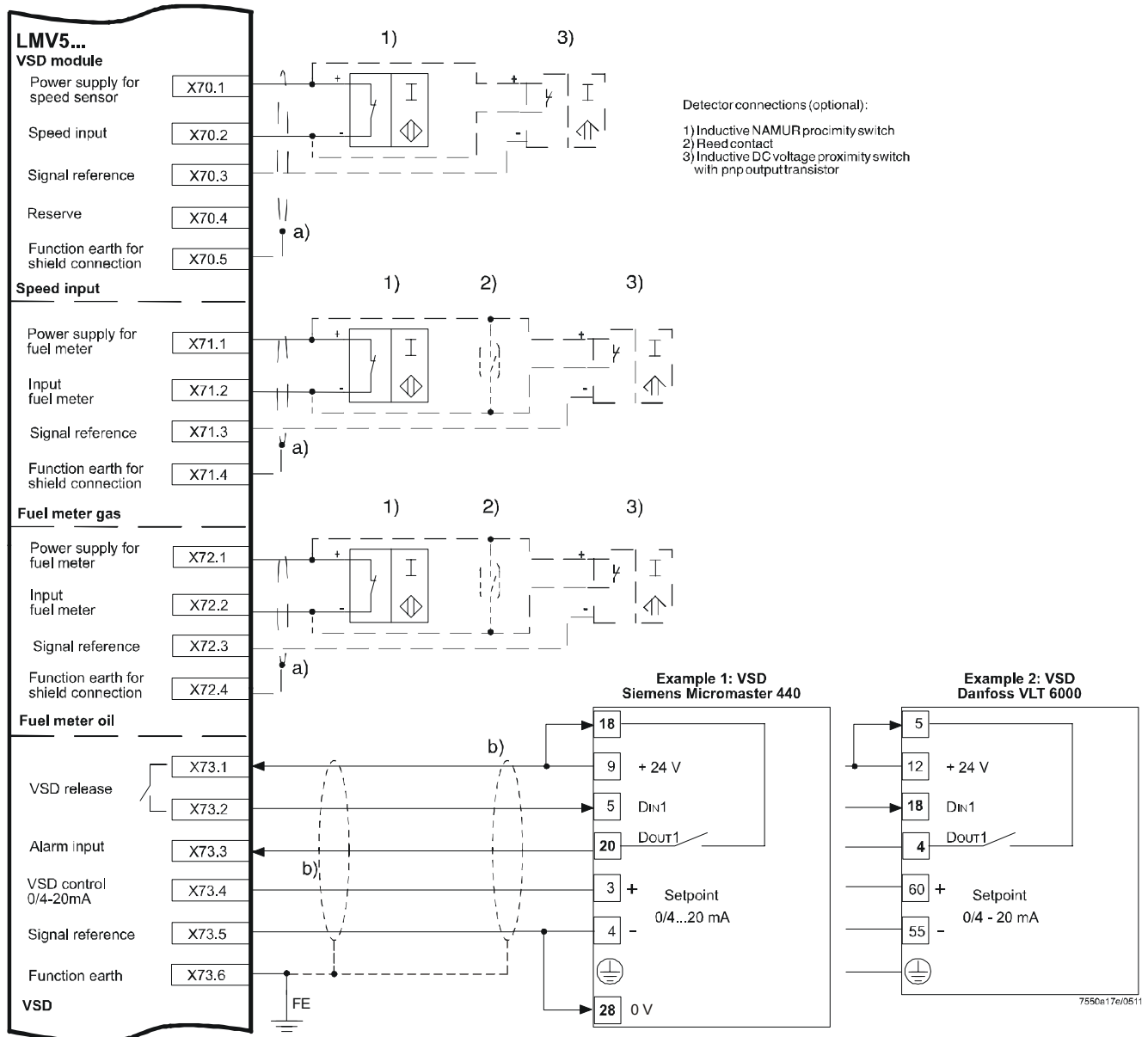
Block diagram inputs / outputs (cont'd)



7550a26e/0718



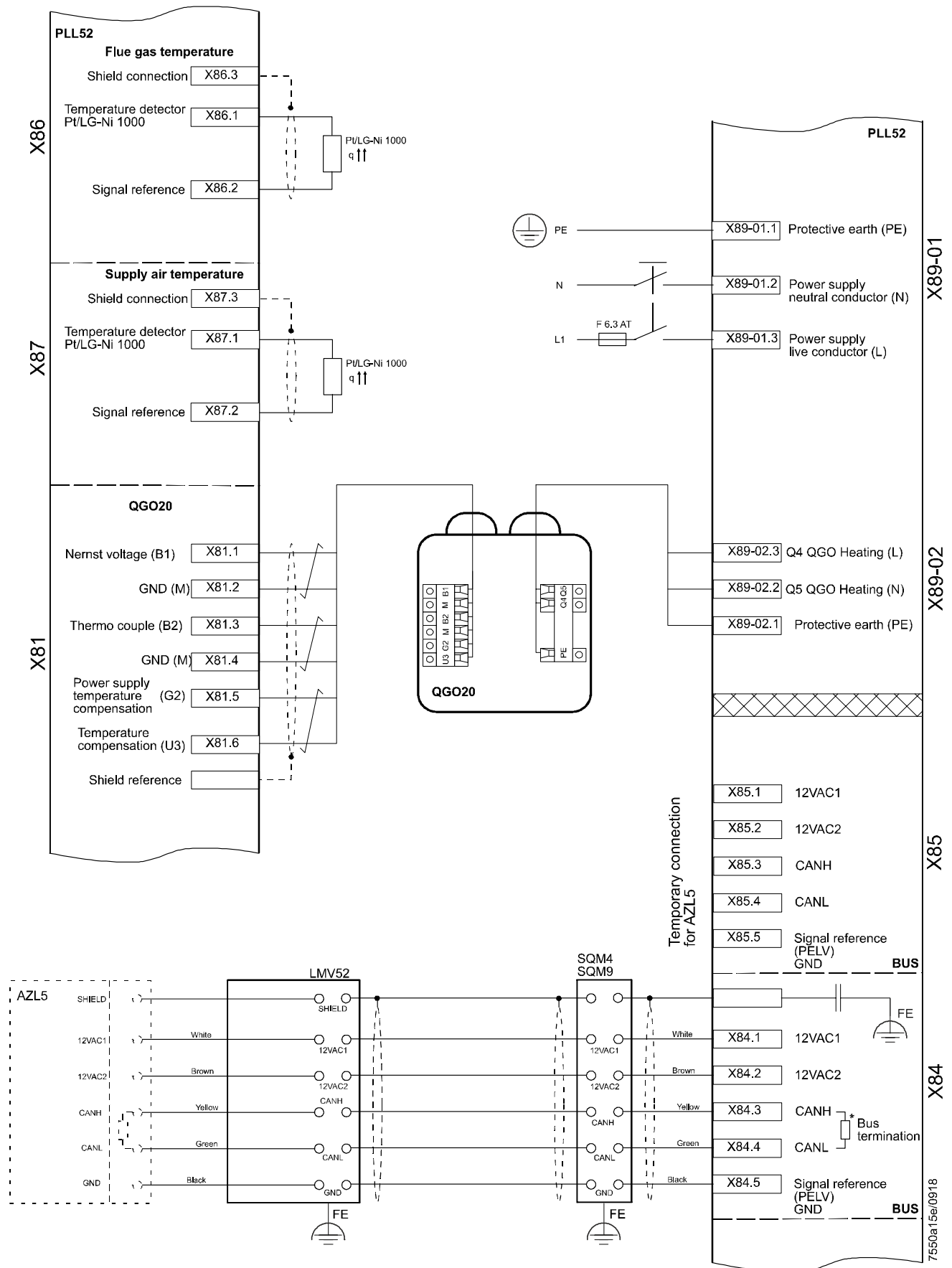
Connection terminals



Shielding:

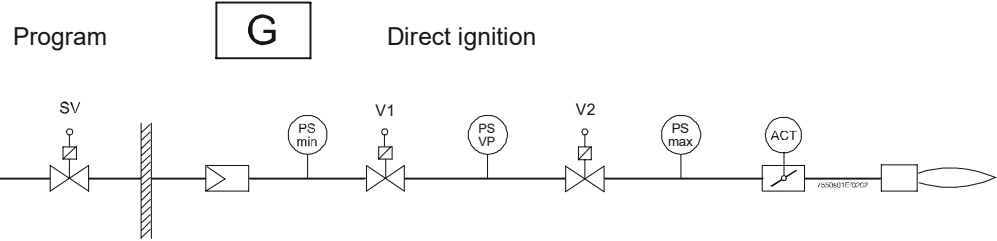
- a) Optional shield connection for rough environmental conditions
- b) Alternative connection of VSD, refer to documentation of used VSD

Terminal markings for LMV52 with PLL52

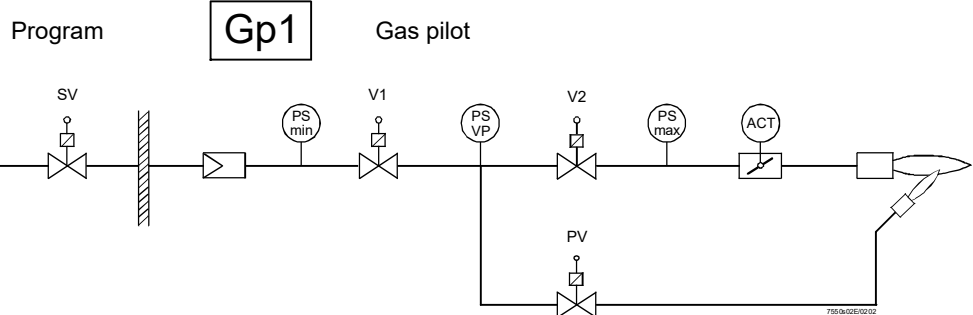


Fuel train (examples)

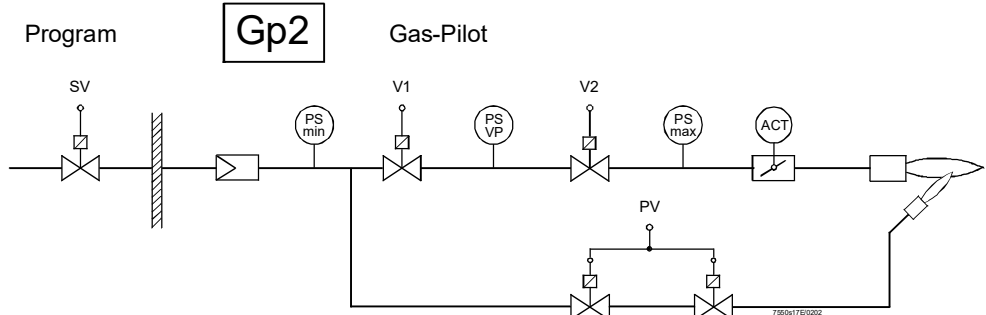
Direct gas ignition



Gas pilot ignition 1

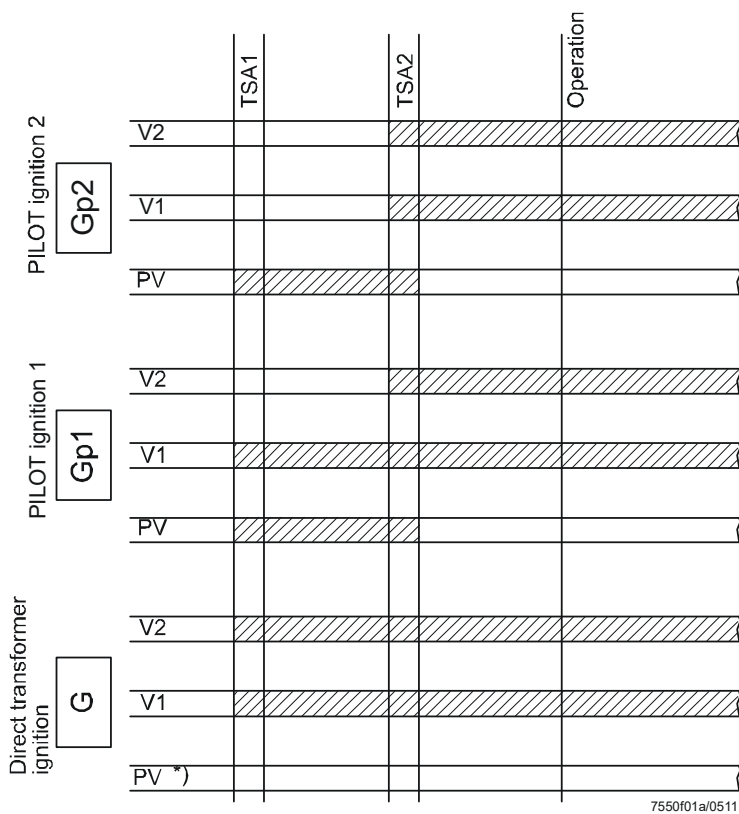


Gas pilot ignition 2



Fuel valve control

Gas (always modulating)

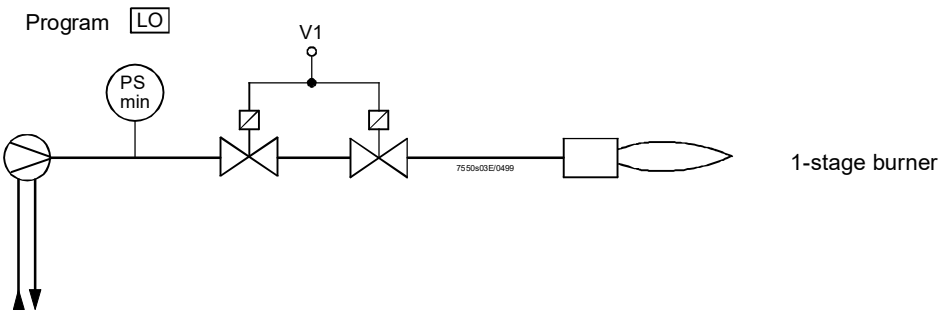
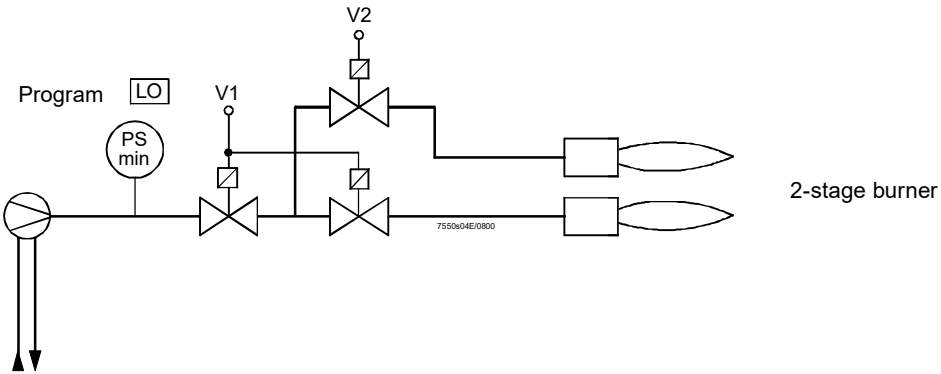
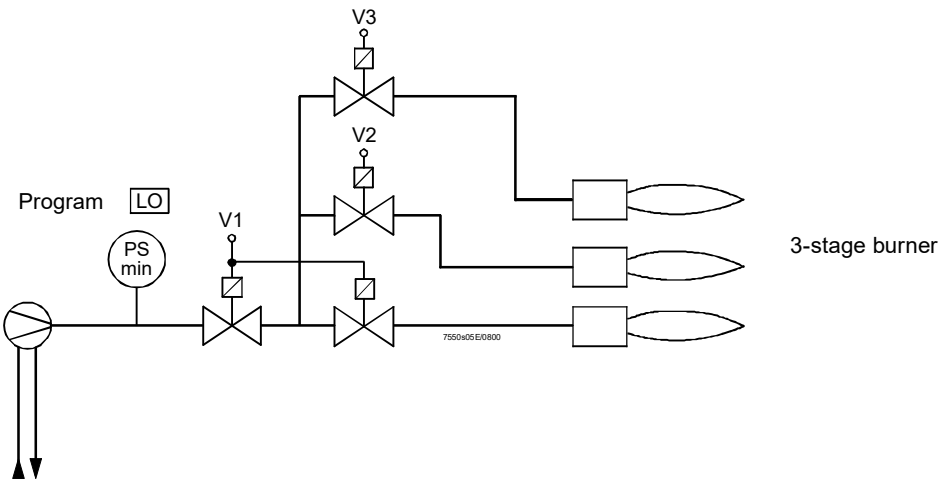


Legend (fuel trains):

- *) Not used
- 1) Preheating device
- HO Heavy oil
- LO Light oil
- No **N**ormally **O**pen
- DK Gas valve proving
- DW Pressure switch
- HE Heating element
- SA Actuator
- SV Shutoff valve (outside the building)
- PV Pilot valve
- Vx Fuel valve

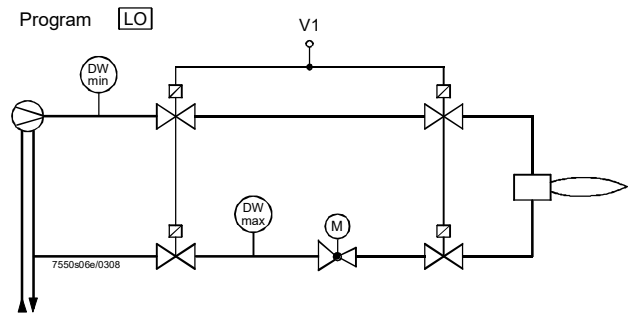
Fuel train (examples) [cont'd]

Direct ignition with
light oil, multistage

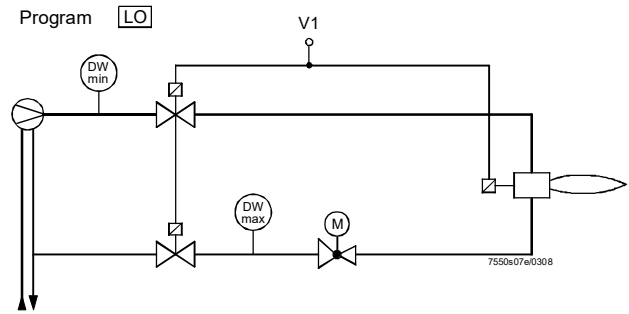


Fuel train (examples) [cont'd]

Direct ignition with
light oil, modulating



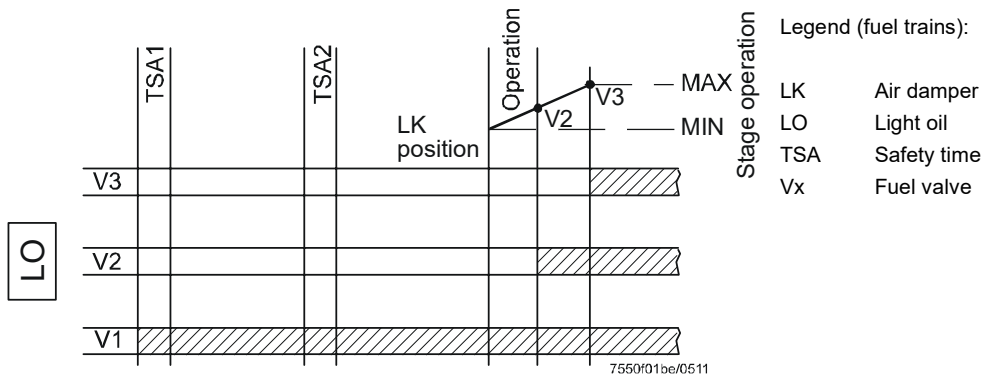
Modulating burner
(without shutdown facility for
adjustable head)



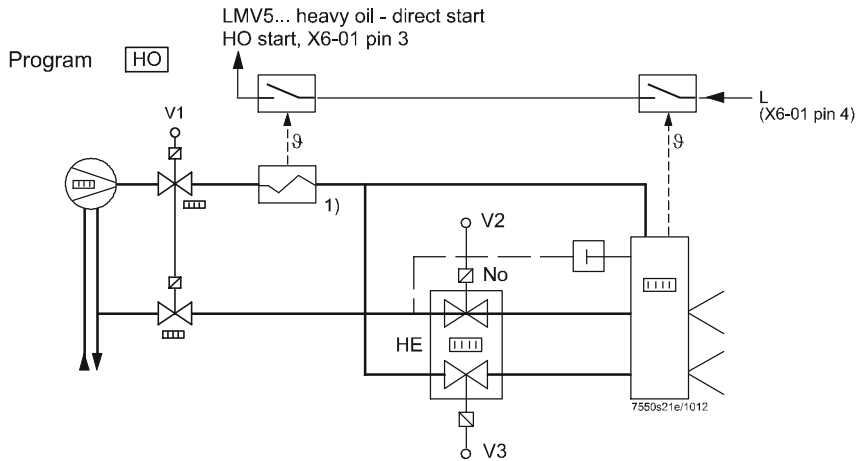
Modulating burner
(with shutdown facility for
adjustable head)

Fuel valve control

Light oil (direct transformer ignition)

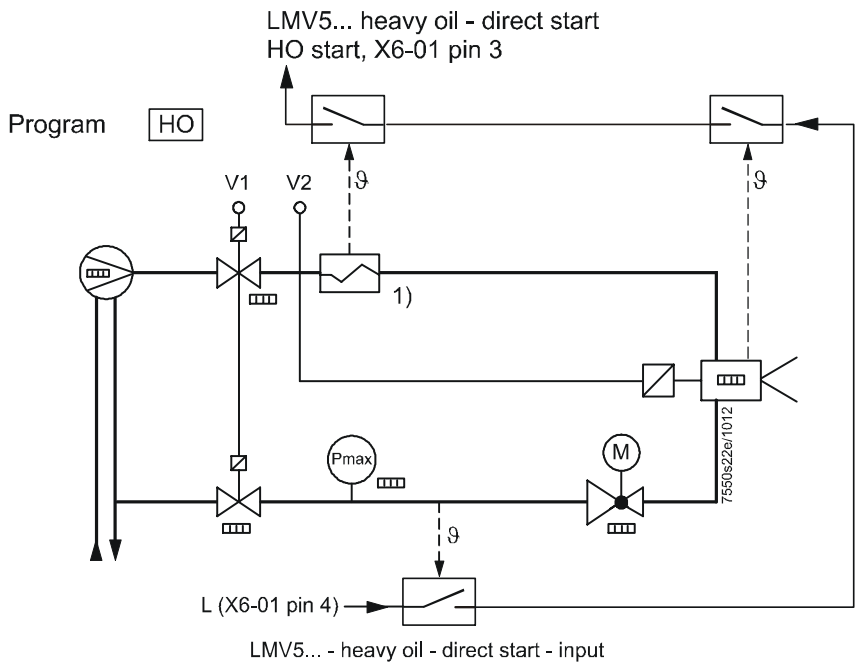


Direct ignition with heavy oil, multistage



2-stage burner

Direct ignition with heavy oil, modulating



Modulating burner

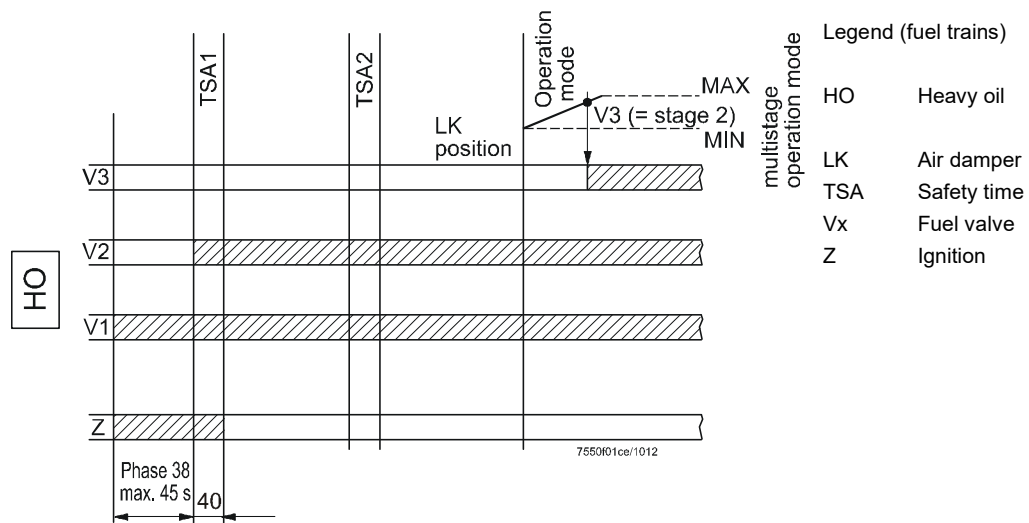
Circulation from phase 38, max.
45 s, as soon as heavy oil direct start
= ON in phase 38:
→ phase change in phase 40

Heavy oil direct start = OFF
at the end of phase 38
→ Restart (max. 3 times in total)

Fuel train (examples) [cont'd]

Fuel valve control

Heavy oil (direct transformer ignition)



Note on dual-fuel burner!

Gas trains **G**, **Gp1** and **Gp2** ¹⁾ can be randomly combined with oil trains **LO** and **HO** for operation with dual-fuel burners since these fuel trains operate independently.

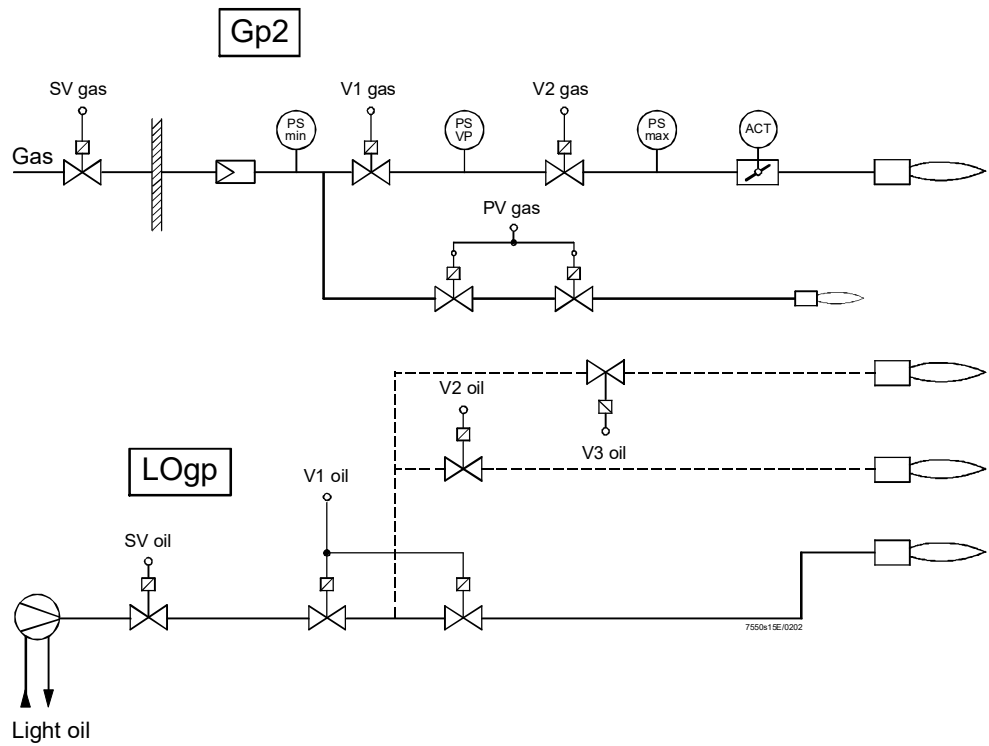


Caution!

Oil trains **LOgp** and **HOgp** are designed for ignition with a gas pilot. They must only be combined with a special gas train **Gp2** for operation with a dual-fuel burner.

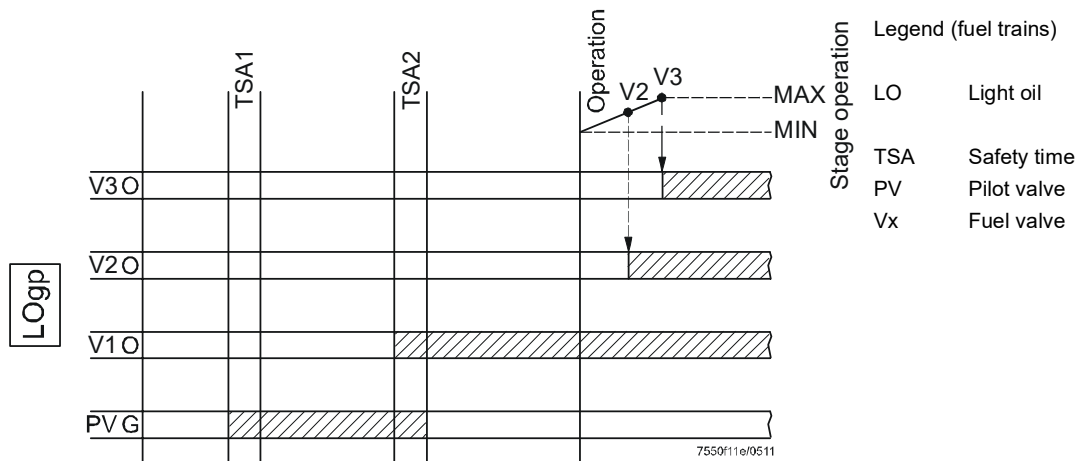
- 1) With **Gp2** permitted with HW 01.C0, SW V01.40 or higher.
- 2)

Dual-fuel burner gas /
light oil with gas pilot
ignition

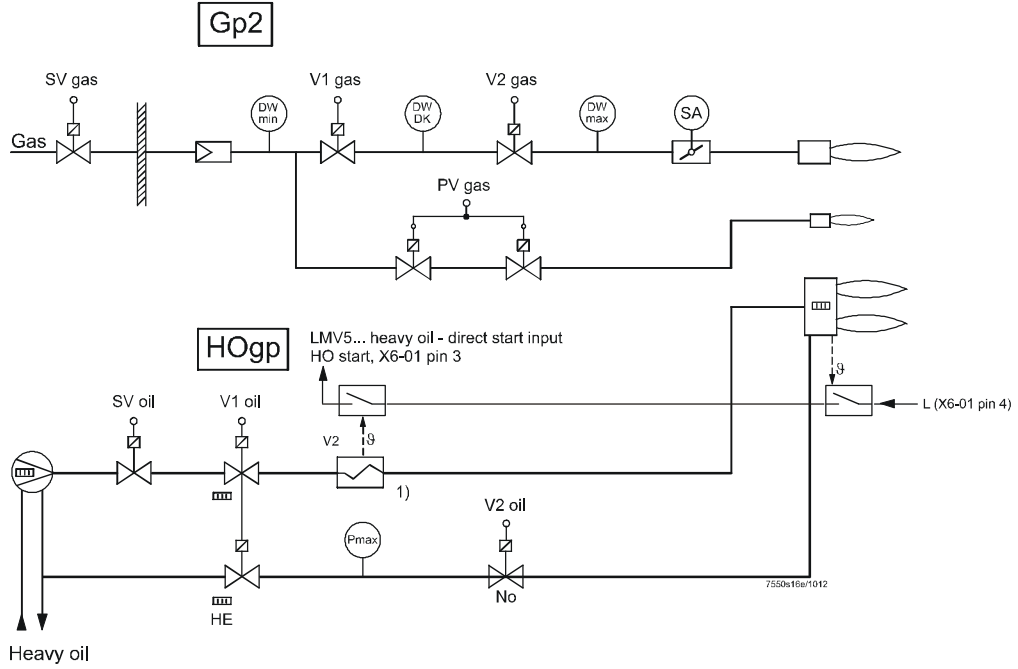


Fuel valve control

Light oil (with gas pilot ignition)

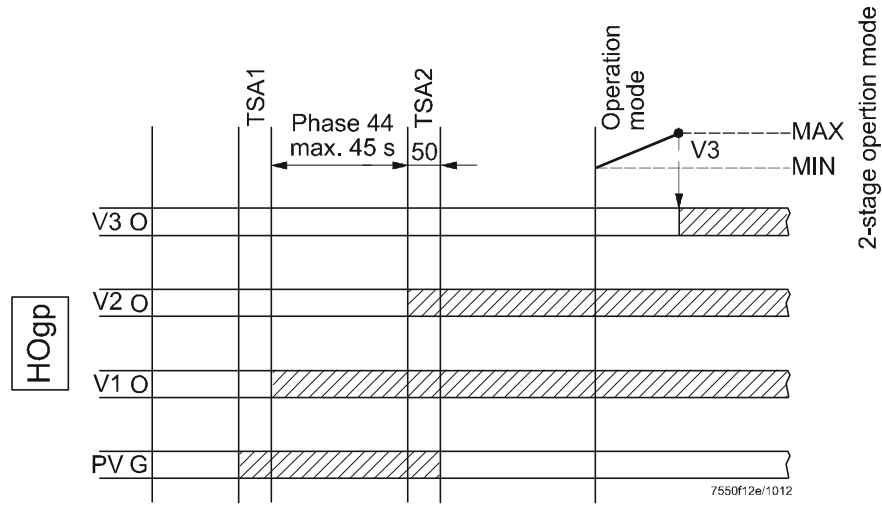


Dual-fuel burner gas / heavy oil with gas pilot ignition



Fuel valve control

Heavy oil (with gas pilot ignition)



Legend (fuel trains):

- HO Heavy oil
- PV Pilot valve
- TSA Safety time
- Vx Fuel valve

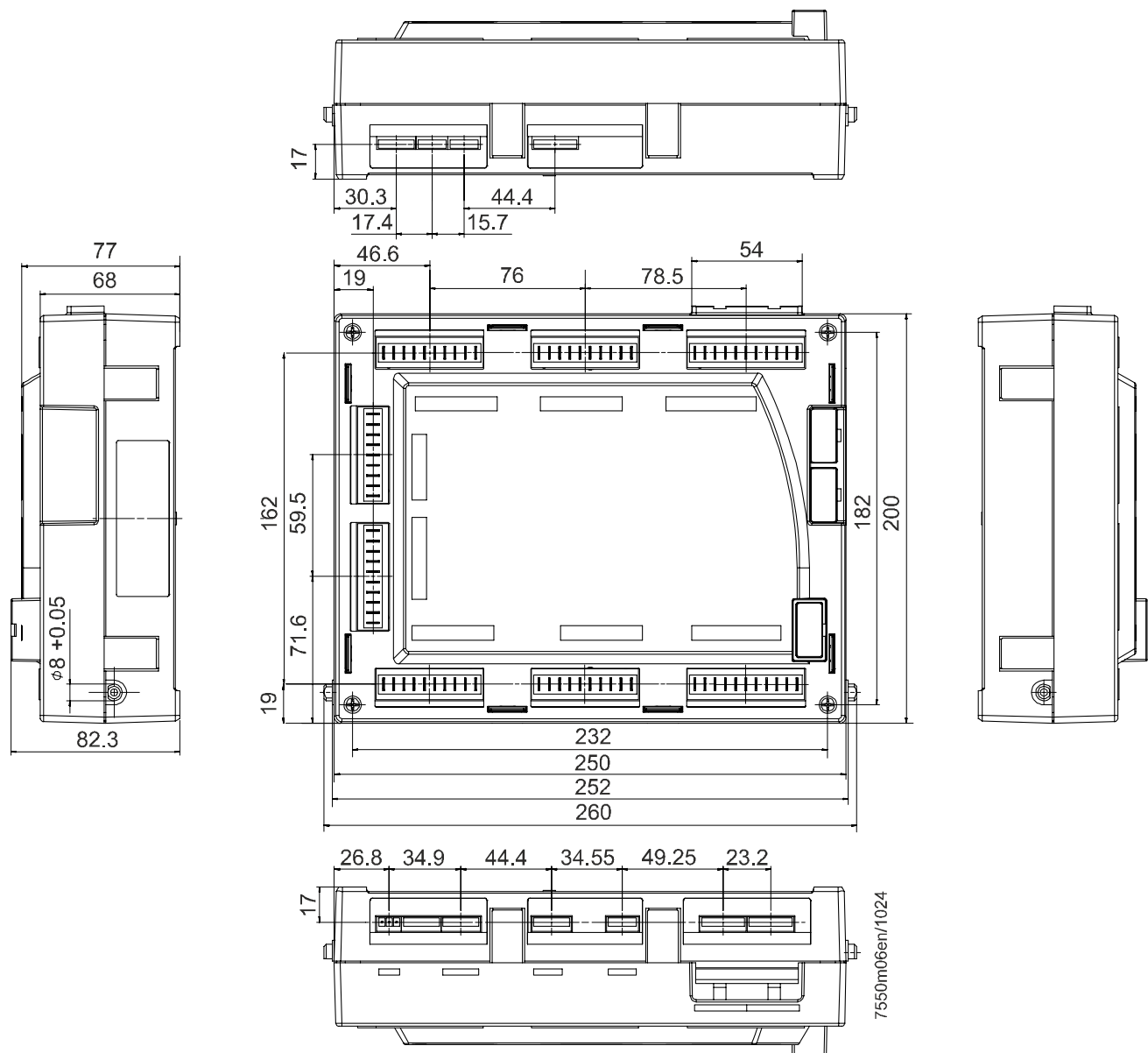
Circulation from phase 44, max. 45 s as soon as heavy oil direct start = ON in phase 44:
→ phase change in phase 50

Heavy oil direct start = OFF at the end of phase 44
→ Restart (max. 3 times in total)

Dimensions

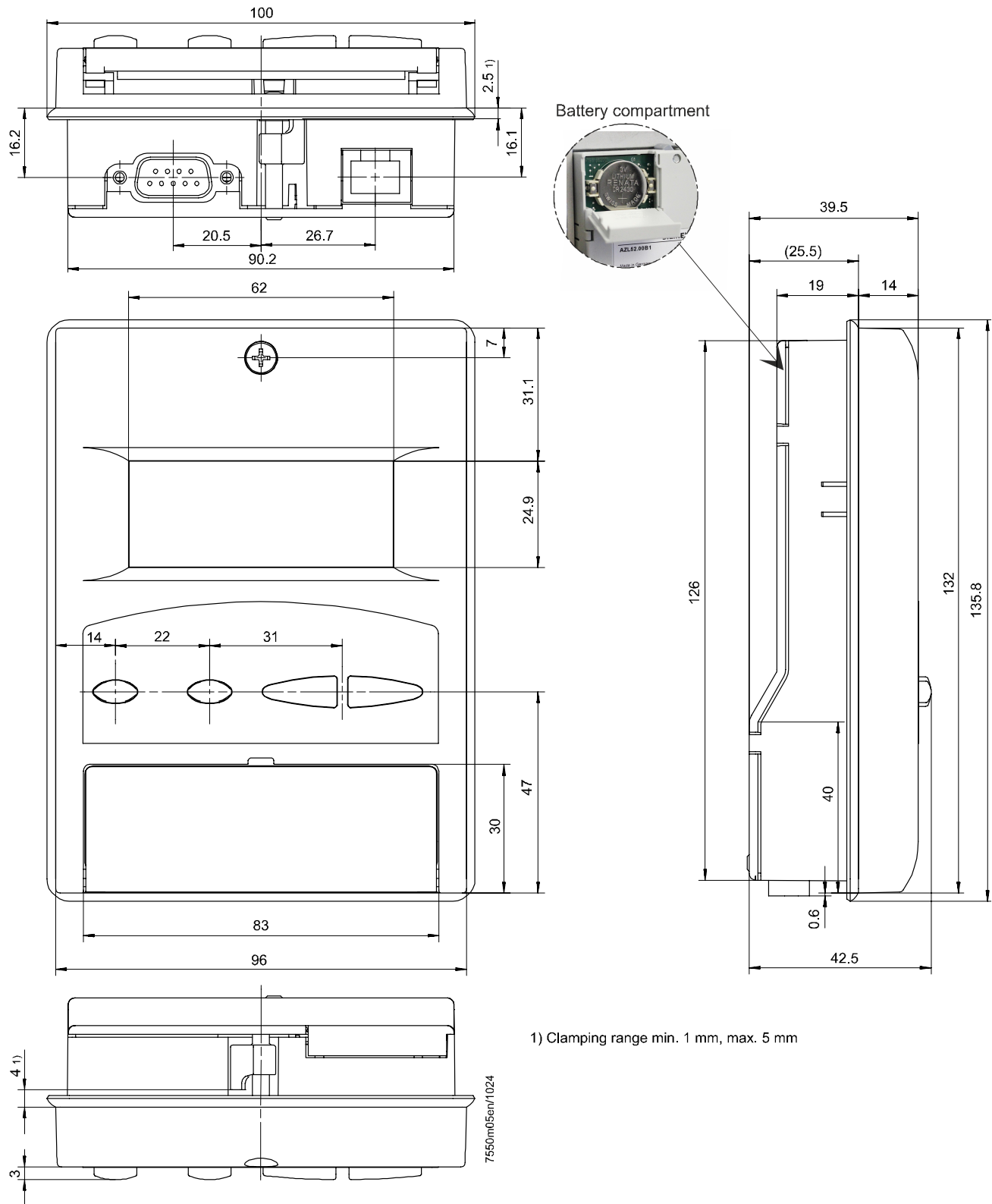
Dimensions in mm

LMV5



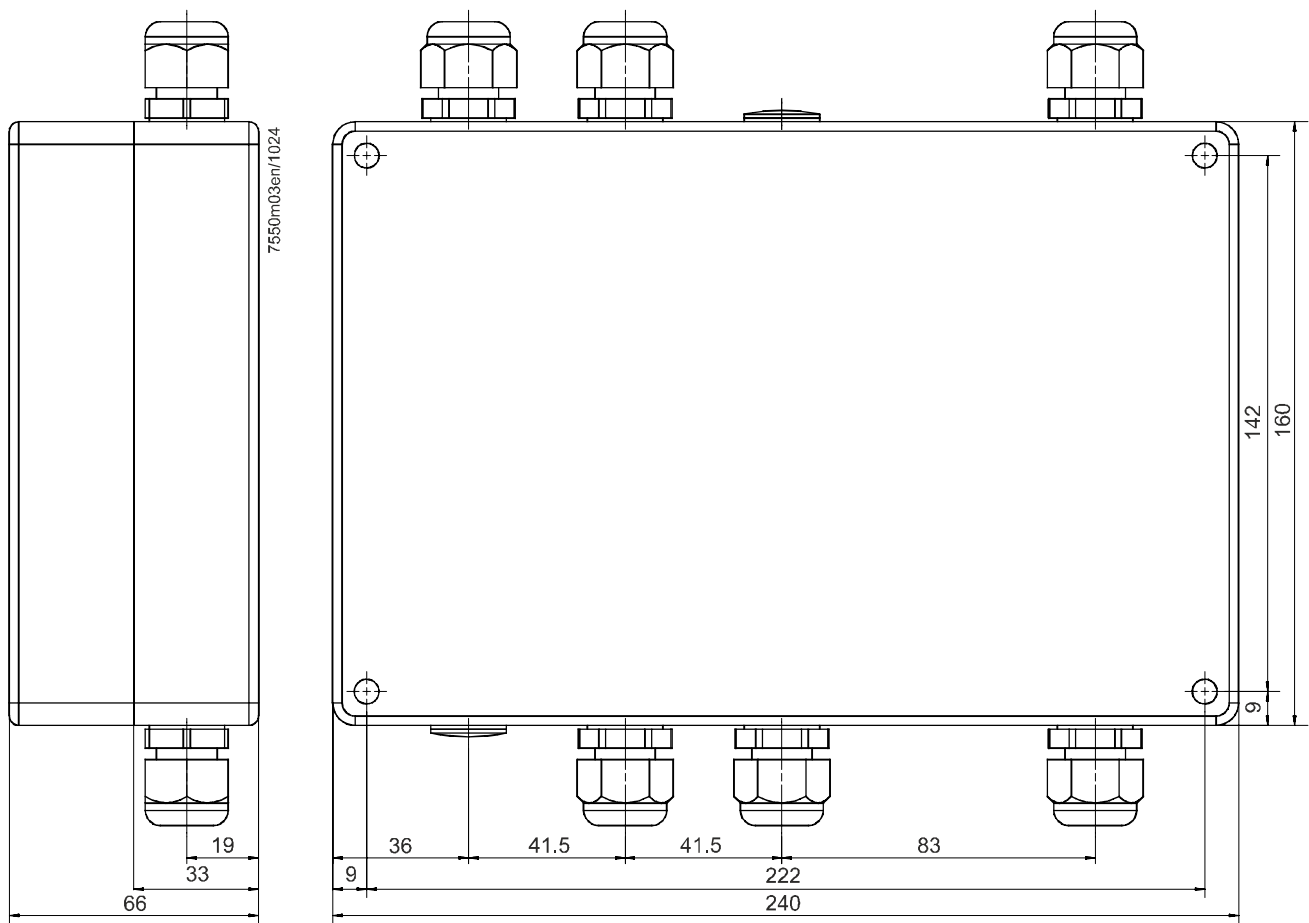
Dimensions in mm

AZL52



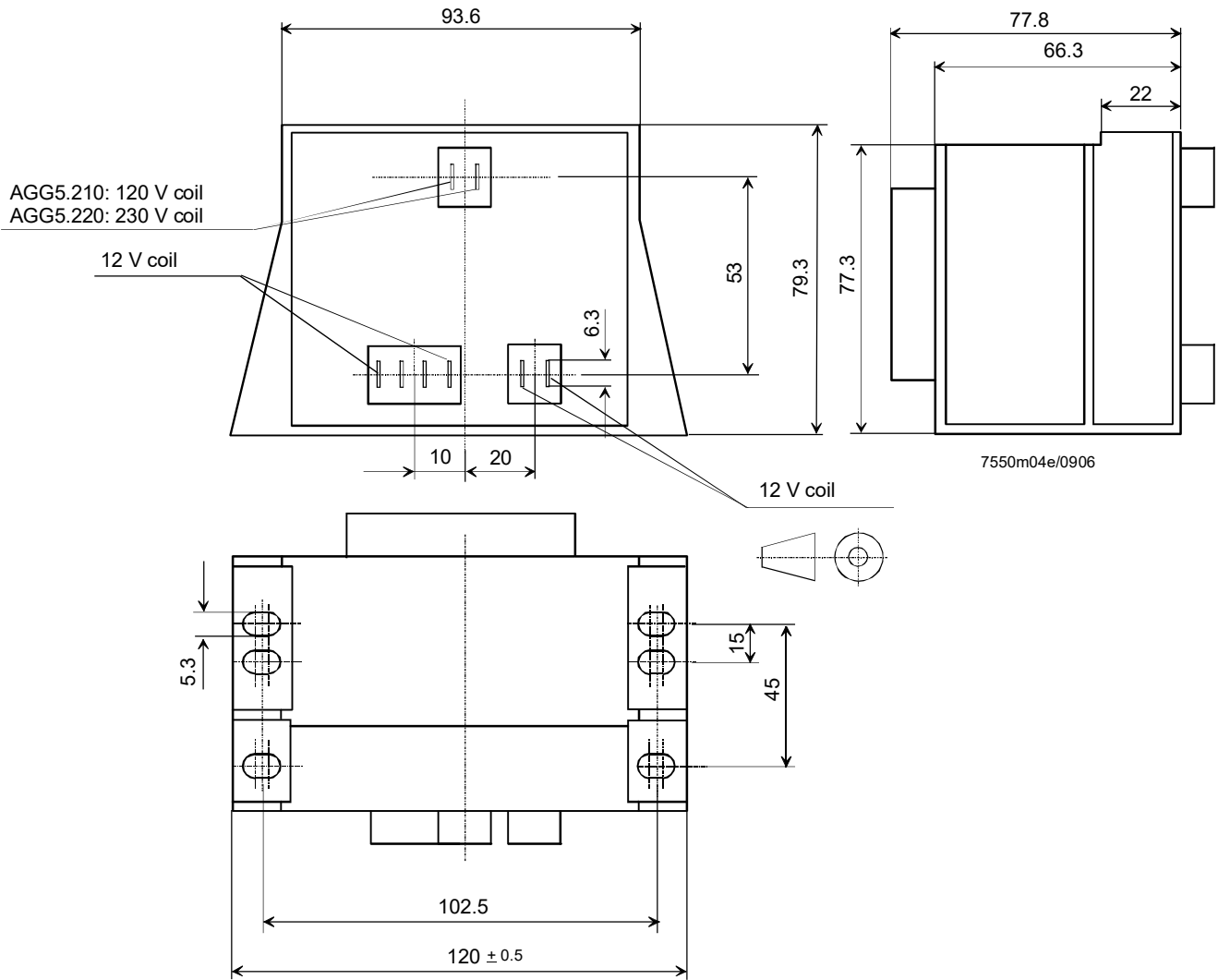
Dimensions in mm

PLL52



Dimensions in mm

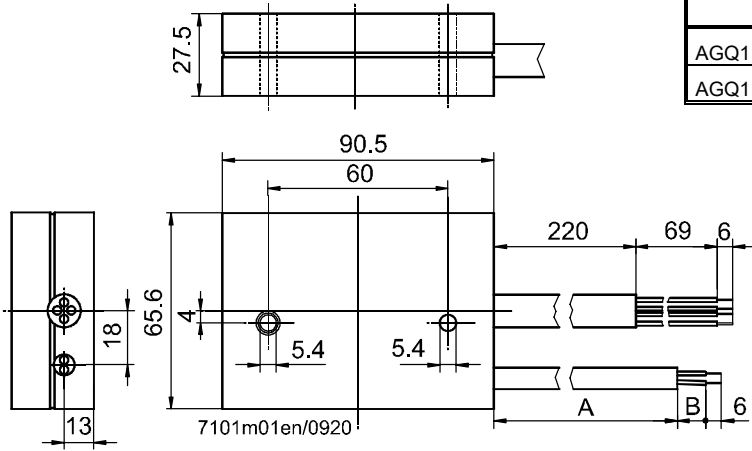
AGG5.210 / AGG5.220



Dimensions in mm

AGQ1.xA27

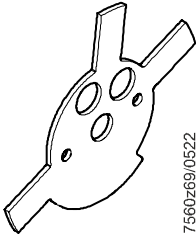
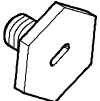
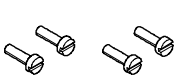
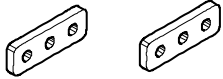
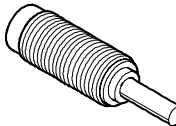
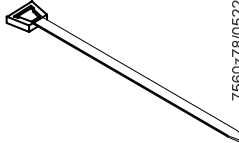
Type	Measure	
	A	B
AGQ1.2A27	300	220
AGQ1.3A27	1200	350



Mounting instructions for the speed sensor

AGG5.310/AGG5.315

Scope of delivery

1	1x sensor disk		7560z69/0522
2	1x Belleville washer		7560z70/0522
3	1x fixing screw M8 x 12 mm		7560z71/0522
4	1x sensor holder		7560z72/0522
5	4x spring washers		7560z73/0522
6	4x self-tapping cheese-head screws M3 x 10 mm		7560z74/0522
7	2x threaded plates		7560z75/0522
8	1x sensor		7560z76/0522
9	1x locknut		7560z77/0522
10	1x cable tie		7560z78/0522

Warning!

Dangerous mixtures.

Assembly must be carried out in accordance with these instructions, as incorrect speed measurements can lead to dangerous mixtures. An annual check is necessary to ensure that the sensor disk is correctly seated together with the fixing screws, sensor holder, and sensor. Readjustment is advisable if necessary.



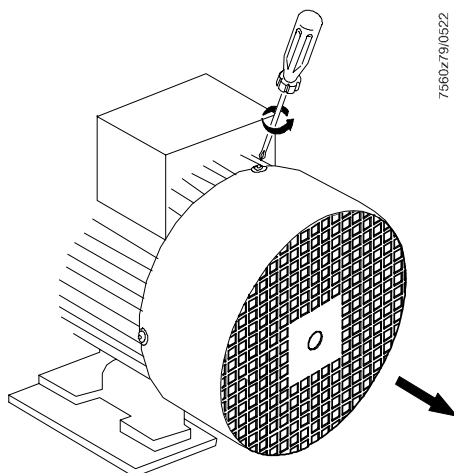
Step 1



Please note!

Guarantee warranty.

Contact your motor supplier regarding the warranty conditions before any interventions in the motor.

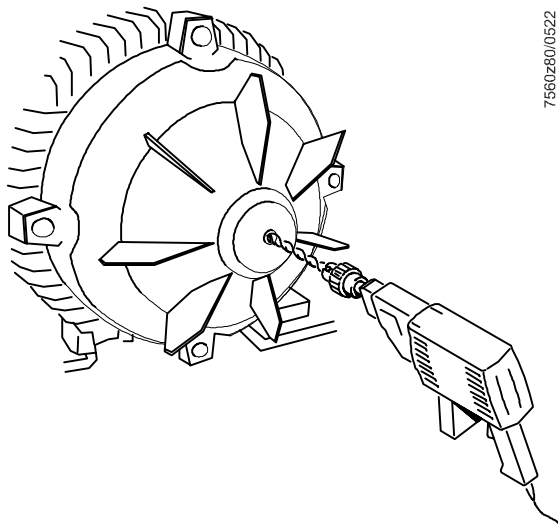


Motor example

Remove the protective hood of the motor.

Maximum thickness of the protective grating: 2 mm.

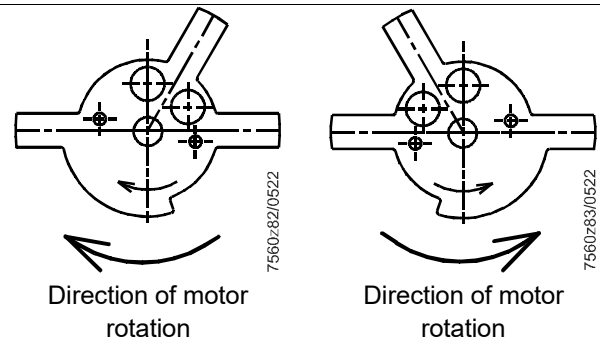
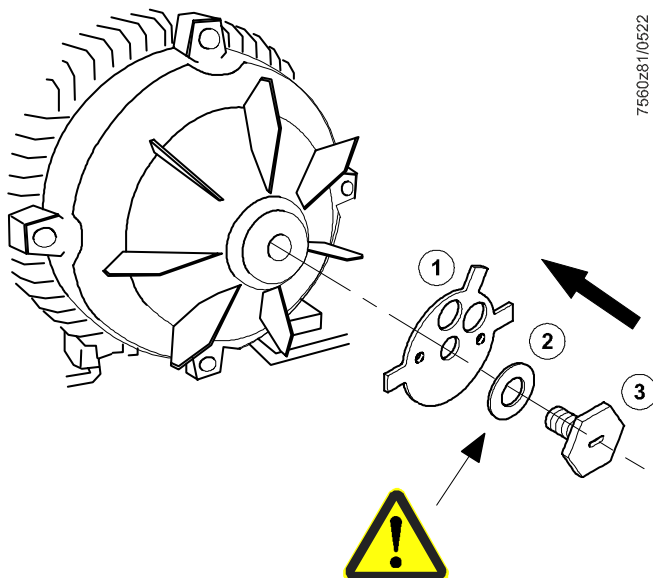
Step 2



- Bore a centering hole in the motor shaft measuring at least 18 mm in length.
Core hole bore $\varnothing$ 6.8 mm
- Cut an M8 x 15 mm thread.
The use of an M8 x 12 mm screw **must** be ensured.

Motor example

Step 3



- Mount the sensor disk ① observing the direction of motor rotation (refer to figure above)

AGG5.310 mounting kit:

Small speed sensor disk ($\varnothing$ 50 mm) for shaft diameter 15...50 mm

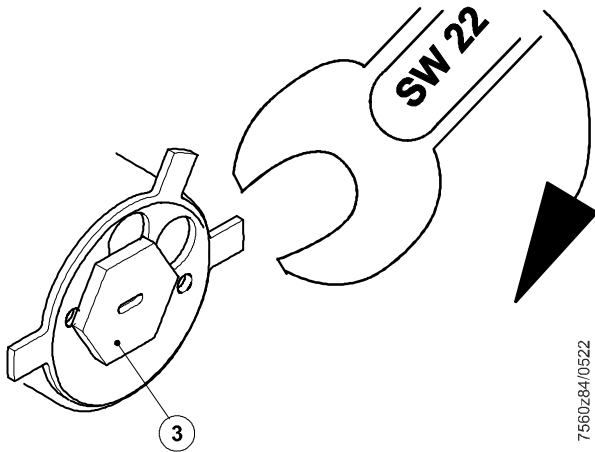
AGG5.315 mounting kit (on request):

Large speed sensor disk ($\varnothing$ 70 mm) for shaft diameter 51...70 mm

- Attach the sensor disk ① and the belleville washer ② (**IMPORTANT!**) to the motor shaft using the fixing screw ③

Motor example

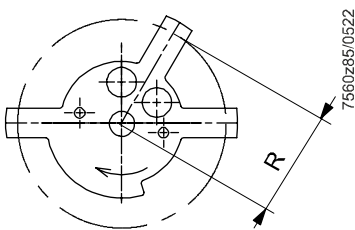
Step 4



Tighten the fixing screw ③ using a wrench (width across flats: 22).

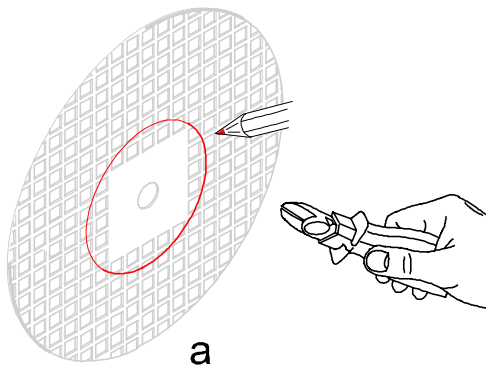
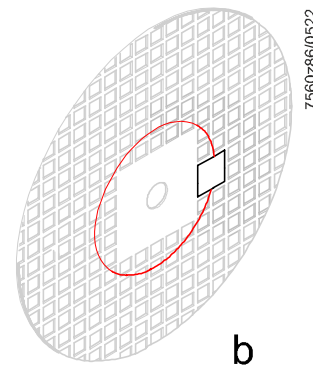
Torque:
Min. 3 Nm
Max. 6 Nm

Step 5

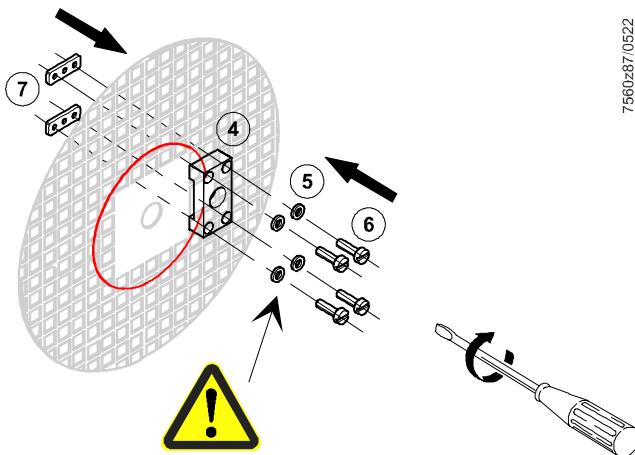


Small speed sensor disk: $R = 41 \text{ mm}$
Large speed sensor disk: $R = 51 \text{ mm}$

- Draw a circle (centric) by means of a pin (refer to figure a) with a given radius (41 mm or 51 mm respectively) on the grating of the protective hood
- Using cutters, cut through the struts on the grating for fastening the sensor holder in place (position similar to figure b)
- Ensure that the position of the hole for the sensor holder coincides with the position of one sensor disk tooth



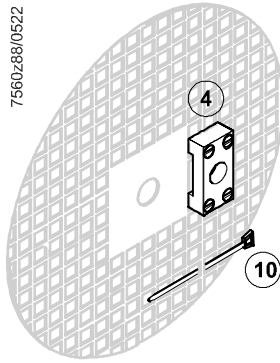
Step 6



Fasten the sensor holder ④ in place with the 2 threaded plates ⑦ (rear side of the grating) by means of the 4 spring washers ⑤ (**IMPORTANT!**) and the 4 M3 x 10 mm screws to the grating (refer to figure for position).

The radius of the drawn circle should pass through the center of the hole for the sensor holder.

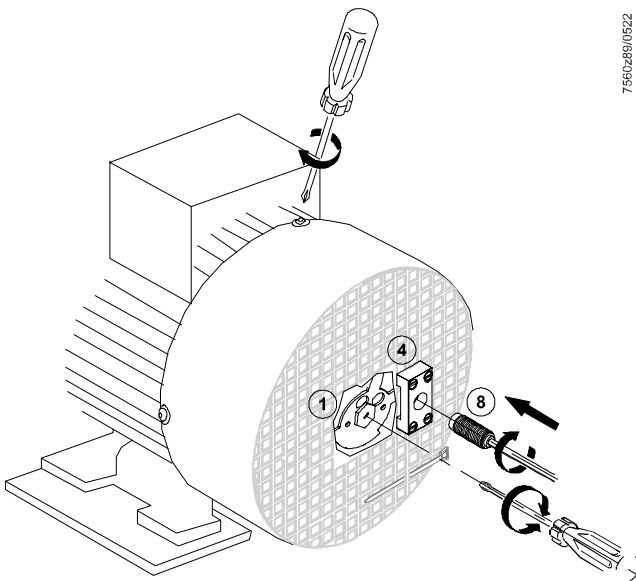
Step 7



Thread the cable tie ⑩ centrally and below to the sensor holder ④ on the grating (as shown).

The cable tie is used to fasten the sensor holder in place later.

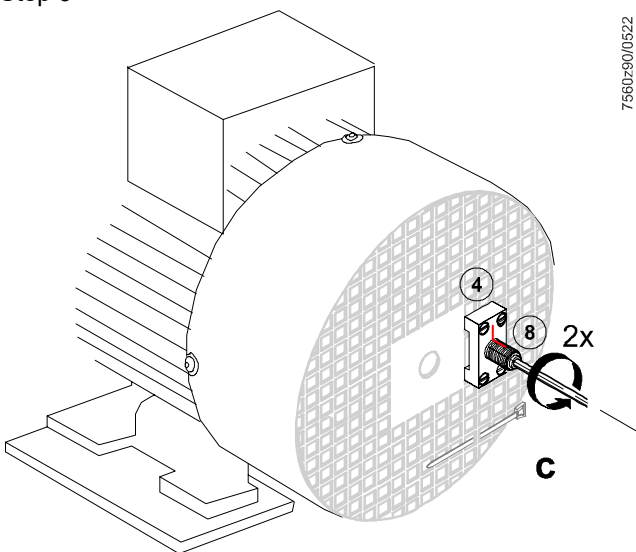
Step 8



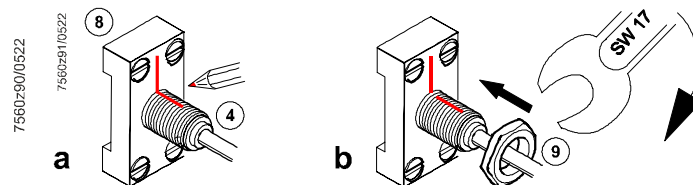
Motor example

- Reattach the protective hood to the motor
- If necessary, use the screwdriver to place the sensor disk tooth ① under the hole of the sensor holder ④
- Screw the sensor ⑧ into the sensor holder ④ until the sensor ⑧ comes into **slight contact** with a sensor disk tooth ①. The sensor disk tooth ① and the protective hood must not be deformed in the process

Step 9

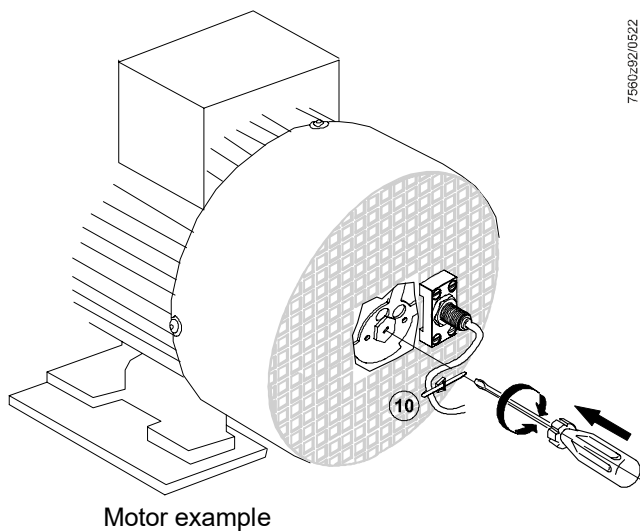


Motor example



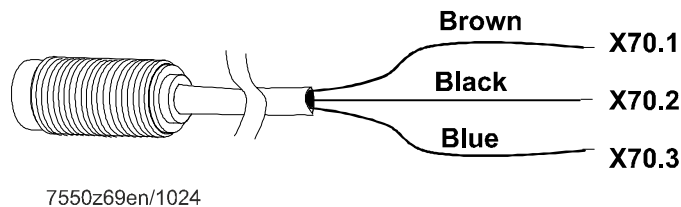
- Mark the sensor ④ and the sensor holder ⑧ (refer to figure a) and unscrew the sensor ④ by 2 mm (refer to figure c). The 2 mm correspond to 2 full revolutions
- Distance between the sensor ④ and the sensor disk ①: 2 mm $\pm$ 0.1 mm
- Then secure the sensor ④ with the locknut ⑨ using a wrench (width across flats: 17) (refer to figure b)

Step 10



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- Fasten the sensor cable to the grating with the cable tie ⑩
- Use a screwdriver to turn the motor shaft with the sensor disk ① once around its own axis. This is necessary to ensure that no collisions occur between the sensor disk ① and the sensor ⑧
- Run the sensor cable separately and connect the sensor cable to the LMV5
- The connector required for the connection is included in the AGG5.720 connector set



● U-Sensor	X70
● Pulse in	
● 0	
● Reserve	
● FE	

Selection of the fan motor

1. **Fan motor supplier:** Variant with M8 x 15 threaded hole
2. **Standard motor:** In this variant, the M8 x 15 thread must be cut into the hole by the customer.