SIEMENS

7550

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

The LMV5 is a microprocessor-based burner control 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:	V10.60
LMV51:	V05.60
LMV51.3:	V05.60
LMV52.2..:	V05.60
LMV52.4:	V10.60
Int. LR module:	V02.20
Int. VSD module:	V01.50
AZL52:	V05.30
PLL52:	V01.50

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Smart Infrastructure

Supplementary documentation

Product type	Product designation	Documentation type	Documentation number
ACS450	PC software	Operating instructions	J7550
AGG5.210 AGG5.220	Supply transformer	Basic documentation	P7550
AGG5.310 AGG5.315	Mounting kit	Basic documentation	P7550
AGG5.641 AGG5.631	CAN bus cable	Basic documentation	P7550
AGG5.720 AGG5.721	Connector set	Basic documentation	P7550
AGM23	Cable to QRA7	Data sheet	N7712
AGO20	Flue gas collector	Data sheet	N7842
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
		Operating instructions	U7550.1
AZL52 / LMV52	Display and operating unit / burner management system	Operating instructions	U7550.2
		Operating instructions	U7550.3
AZL52 / LMV50	Display and operating unit / burner management system	Operating instructions	U7550.4
		Operating instructions	U7550.5
LMV5	Burner management system	Basic documentation	P7550
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	Product range overview (this document contains a complete overview)	Q7550
LMV52	Burner management system	User documentation (COx supervision and COx control)	A7550.5
OCI460	Cloud gateway	Data sheet	N7600
QRA2 QRA7 QRA10	UV flame detector	Data sheet	N7712
QRA4	UV flame detector	Data sheet	N7711
QRB1 QRB3	Photoresistive detector	Data sheet	N7714
QRI2	Infrared flame detector	Data sheet	N7719
QGO20	Oxygen sensor	Data sheet	N7842
		Basic documentation	P7842
PLL52	O2 module	Basic documentation	P7550
RWF50	Universal controller	Data sheet	N7866
RWF55	Universal controller	Data sheet	N7867
SQM45 SQM48	Actuator	Data sheet	N7814
SQM9x	Actuator	Data sheet	N7818

Note
In some instances, 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) 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
  Part 2: Fuel/air ratio control/supervision of the electronic type — DIN EN 12067-2
- 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
  Part 1: Fuel-air ratio controls, electronic type — ISO 23552-1
- Automatic electrical controls for household and similar use
  Part 2-5: Particular requirements for automatic electrical burner control systems — DIN EN 60730-2-5

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 O2 module 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 Kingdor
Type	TÜV	TÜV CERT	DIN Geprüft	DVGW	EAC	UL	CSA C US	FM APPROVED	AGA	bsi.
LMV50.320E2	●	●	●	●	●	---	---	---	●	●
LMV51.000E2	●	●	●	●	●	---	---	---	●	●
LMV51.040E1	---	---	---	---	●	●	●	●	●	---
LMV51.100E1	●	●	●	●	●	●	---	---	●	●
LMV51.100E2	●	●	●	●	●	---	---	---	●	●
LMV51.140E1	---	---	---	---	●	●	●	●	●	---
LMV51.300E1	●	●	●	●	●	●	---	---	●	●
LMV51.300E2	●	●	●	●	●	---	---	---	●	●
LMV51.340E1	---	---	---	---	●	●	●	●	●	---
LMV52.200E1	●	●	●	●	●	●	---	---	●	●
LMV52.200E2	●	●	●	●	●	---	---	---	●	●
LMV52.240E1	---	---	---	---	●	●	●	●	●	---
LMV52.240E2	---	---	---	---	●	---	---	---	●	---
LMV52.400E2	●	●	●	●	●	---	---	---	●	●
LMV52.440E1	---	---	---	---	●	●	●	●	●	---

	Ships	
Type	LR	DNV
LMV50.320E2	●	●
LMV51.000E2	●	●
LMV51.040E1	●	---
LMV51.100E1	●	●
LMV51.100E2	●	●
LMV51.140E1	●	---
LMV51.300E1	●	●
LMV51.300E2	●	●
LMV51.340E1	●	---
LMV52.200E1	●	●
LMV52.200E2	●	●
LMV52.240E1	●	---
LMV52.240E2	●	---
LMV52.400E2	●	●
LMV52.440E1	●	---

Standards and certificates (cont'd)

	Europe				Eurasian	America			Australia	United Kingdor
Type	TÜV	TÜV CERT	DIN Geprüft	DVGW	EAC	UL	CSA C US	FM APPROVED	AGA	bsi.
LMV5 system components:										
AZL52	●	●	●	●	●	●	●	●	●	●
QGO20	●	●	●	●	●	●	●	●	●	●
QRA7	●	●	●	●	●	●	●	●	●	●
QRB1/QRB3	●	●	●	●	●	---	●	●	●	●
QRI2	●	●	●	●	●	●	●	●	●	●
PLL52	●	●	●	●	●	●	●	●	●	●
SQM45	●	●	●	●	●	●	●	●	●	●
SQM48	●	●	●	●	●	●	●	●	●	●
SQM9x	●	●	●	●	●	●	●	●	●	●

	Ships	
Type	LR	DNV
LMV5 system components:		
AZL52	●	●
QGO20	---	---
QRA7	●	●
QRB1/QRB3	●	●
QRI2	●	●
PLL52	---	●
SQM45	●	●
SQM48	●	●
SQM9x	---	---

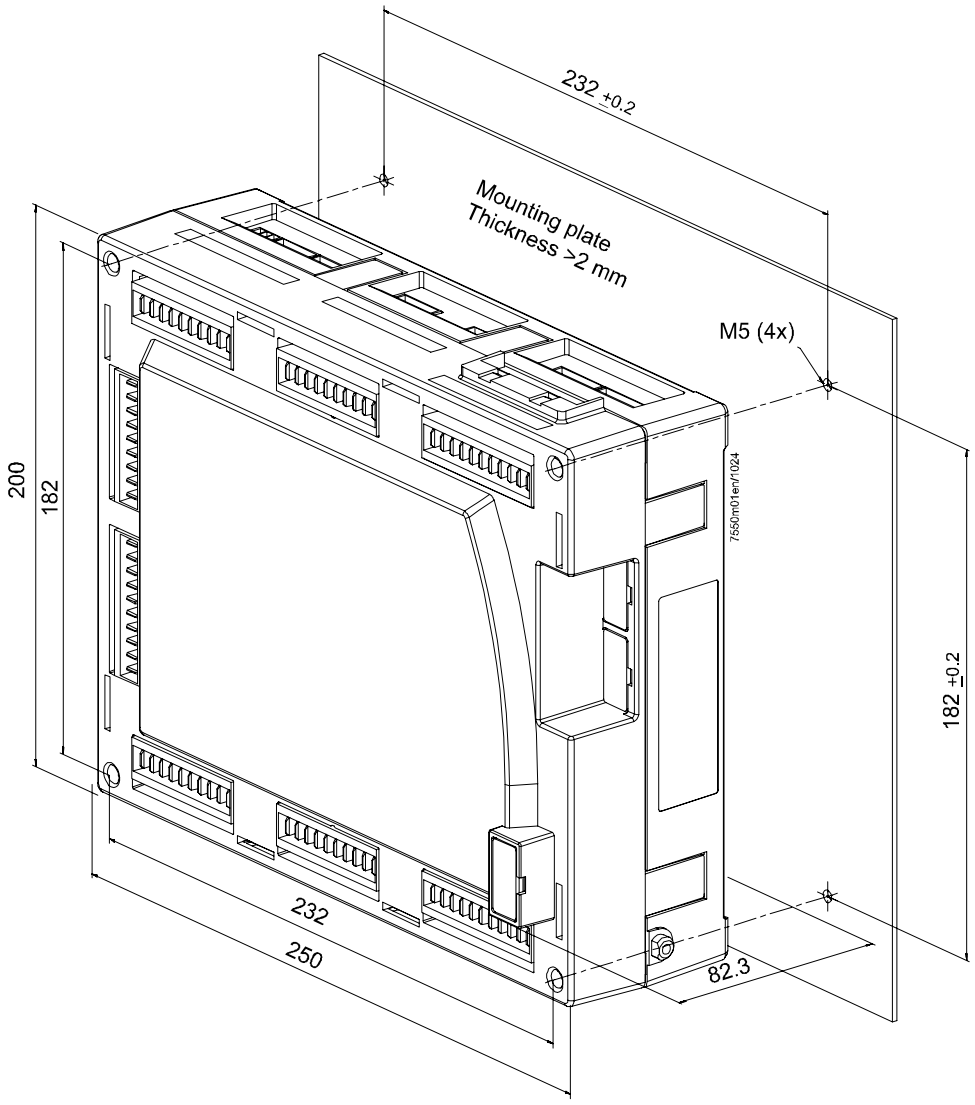
Note!
When using the LMV5 in Australia, we strongly recommend that you use a *BASE PAR GAS.par* file to adapt the parameter set to the specific requirements of the Australian market. Please direct any queries to Siemens Australia.

Note!
For use of the LMV5 in safety-related systems up to SIL3, the LMV5 series B and C are available with the corresponding safety manual (T7550.1) and certificate.

Mounting notes

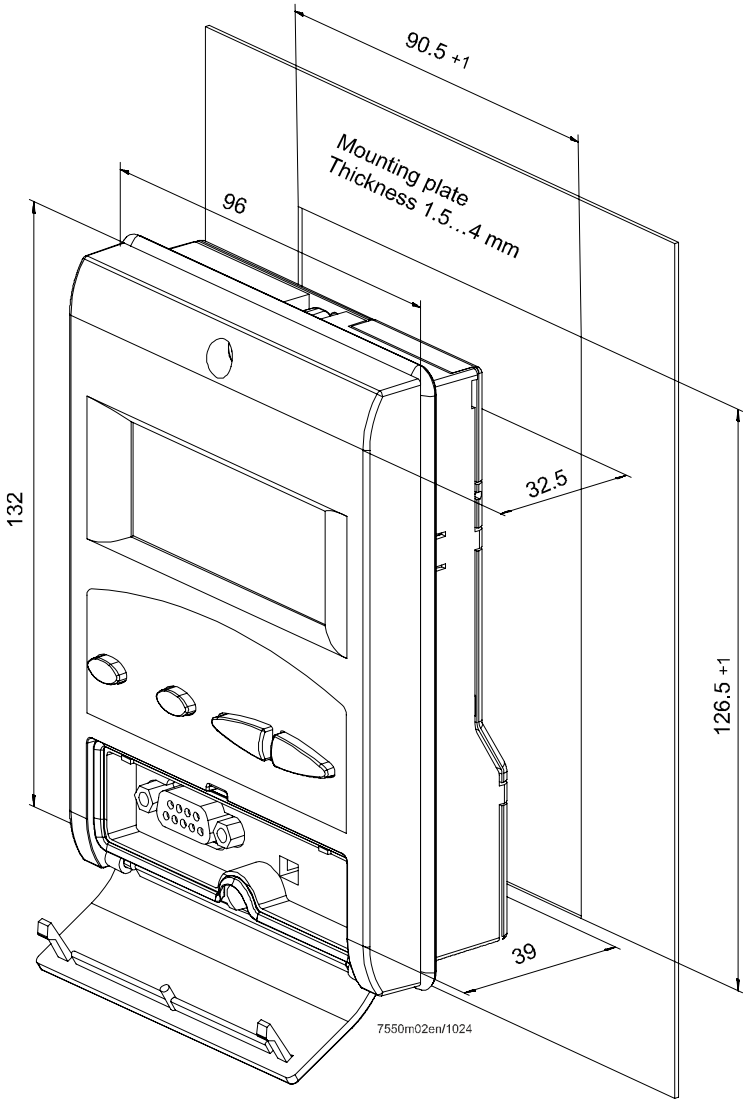
- Ensure that the relevant national safety regulations are complied with
- In the geographical areas where DIN regulations are in use, the requirements of VDE must be satisfied, especially DIN/VDE 0100, 0550 and DIN/VDE 0722
- M5 fixing screws in LMV5 housing with maximum tightening torque of 2 Nm. The 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)

Mounting notes for the AZL52 display and operating unit



Life cycle

The LMV5 has a designed lifetime* of 250,000 burner startup cycles which, under normal operating conditions in heating mode, corresponds to approx. 10 years of usage (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

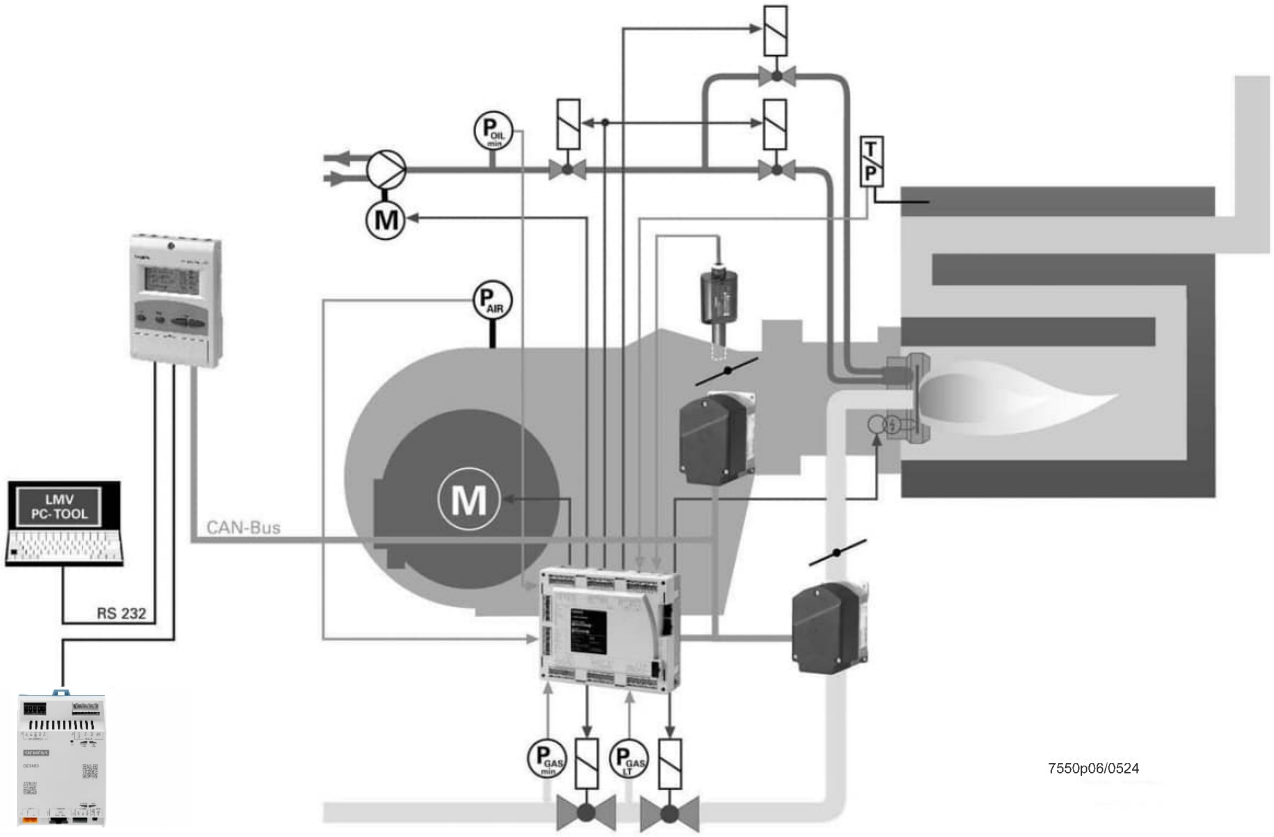
Notes
The total start counter is incremented with each burner start cycle. This also happens if a start attempt is aborted. For details, refer to chapter 'Lifecycle function' in the LMV5 Basic Documentation (P7550).

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:
  - maximum of 4 SQM45/SQM48/SQM9x actuators with LMV50/LMV51
  - maximum of 6 SQM45/SQM48/SQM9x actuators with LMV52
- Optional PID temperature or pressure controller (boiler controller / load controller)
- Optional VSD module



Example:
Dual-fuel burner

- Gas: Modulating
- Oil: 2-stage

The system components (AZL52 display and operating unit, SQM45/SQM48/SQM9x actuator, PLL52 O2 module) are connected via a CAN 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 following can be used: for continuous operation, the QRI2 infrared flame detector / QRA7 UV flame detector or an ionization probe; and for intermittent operation, the QRB1/QRB3 optical photoresistive detectors, QRA2/QRA4/QRA10 UV flame detectors with AGQ1.xA27 UV ancillary unit (230 V~).

The LMV5 is operated and programmed via the AZL52 display and operating unit or ACS450 PC software. The AZL52 display and operating unit features an LCD plain text display and menu-driven operation, offering straightforward operation and targeted diagnostics. For diagnostics, the display shows operating states as well as the type and time of errors. Passwords protect the different parameter levels of the burner/boiler manufacturer and heating engineer against unauthorized access. Basic settings that the plant operator can make on site require no password. The AZL52 display and operating unit also serves as an interface to higher-level systems such as building automation (GA) or to a PC using the ACS450 PC software. Among other features, it provides convenient readout of settings and operating states, LMV5 parameterization, and trend recording. When replacing the LMV5, all parameters can be saved in a backup memory of the AZL52 display and operating unit and then restored to the new LMV5. This eliminates the need for manual reprogramming.

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 adaptions to the specific application.

The SQM45/SQM48/SQM9x actuators are driven by stepper motors and offer high-resolution positioning. Relevant characteristics and settings of the SQM45/SQM48/SQM9x actuators 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
S55402-C301-A100	LMV50.320E2	230 V~	LMV50	5 *)	●	●	●	●	●	●	●	---	10 s	15 s
S55402-C302-A100	LMV51.000E2	230 V~	Europe	4	---	---	---	●	---	---	---	---	10 s	15 s
S55402-C303-A100	LMV51.040E1	120 V~	US / Canada	4	---	---	---	●	---	---	---	---	10 s	15 s
S55402-C304-A100	LMV51.100E1	120 V~	Europe	4	●	●	---	●	●	---	●	---	10 s	15 s
S55402-C305-A100	LMV51.100E2	230 V~	Europe	4	●	●	---	●	●	---	●	---	10 s	15 s
S55402-C306-A100	LMV51.140E1	120 V~	US / Canada	4	●	●	---	●	●	---	●	---	10 s	15 s
S55402-C307-A100	LMV51.300E1	120 V~	Europe	5 *)	●	●	●	●	●	●	●	---	10 s	15 s
S55402-C308-A100	LMV51.300E2	230 V~	Europe	5 *)	●	●	●	●	●	●	●	---	10 s	15 s
S55402-C309-A100	LMV51.340E1	120 V~	US / Canada	5 *)	●	●	●	●	●	●	●	---	10 s	15 s
S55402-C310-A100	LMV52.200E1	120 V~	Europe	6	●	●	●	●	●	●	●	●	10 s	15 s
S55402-C311-A100	LMV52.200E2	230 V~	Europe	6	●	●	●	●	●	●	●	●	10 s	15 s
S55402-C312-A100	LMV52.240E1	120 V~	US / Canada	6	●	●	●	●	●	●	●	●	10 s	15 s
S55402-C313-A100	LMV52.240E2	230 V~	US / Canada	6	●	●	●	●	●	●	●	●	10 s	15 s
S55402-C314-A100	LMV52.400E2	230 V~	Europe	6	●	●	●	●	●	●	●	●	10 s	15 s
S55402-C315-A100	LMV52.440E1	120 V~	US / Canada	6	●	●	●	●	●	●	●	●	10 s	15 s

*) When the VSD module is activated, a maximum of 4 SQM45/SQM48/SQM9x actuators can be controlled.

Type summary

**) 

Attention!
The maximum safety time (TSA) 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!		
Supply transformer - Primary side - Secondary side 1 - Secondary side 2	AGG5.210 AC 120 V 12 V~ 2 x 12 V~	AGG5.220 AC 230 V 12 V~ 2 x 12 V~
Mains frequency	50 / 60 Hz ±6%	50 / 60 Hz ±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	

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~

Terminal loading «Outputs»

Total contact loading:		
(nominal voltage)	**AC 120 V** -15 % / +10 %	**AC 230 V** -15 % / +10 %
• Unit input current (safety loop) total contact current from: - Fan motor contactor - Ignition transformer - Fuel valves - Oil pump / magnetic clutch	Max. 5 A	Max. 5 A
Individual contact loading:		
Fan motor contactor		
• Nominal voltage	**AC 120 V**	**AC 230 V**
• Nominal current	1 A	1 A
• Power factor	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	

☞ [1)] Note!
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)!

Beyond a certain cable length, an AGG5.2x0 supply transformer is required near the SQM45/SQM48/SQM9x actuators to provide the power supply.

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 mm² (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 display and operating unit

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, Itingen / CH	CR 2430
Pollution degree	2

Technical data (cont'd)

PLL52 O2 module	'Terminal X89-01' mains voltage	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:		
	• 'Terminal X89' electrical connection	Screw terminals up to 2.5 mm²	
	• Cable lengths	≤10 m to QGO20 oxygen sensor	
	• Cross-sectional areas	Refer to description of the QGO20 oxygen sensor Twisted pairs	
	Analog inputs:		
	• Supply air temperature sensor	Pt1000 / LG-Ni1000	
	• Flue gas temperature sensor	Pt1000 / LG-Ni1000	
	• QGO20 oxygen sensor	Refer to Data Sheet N7842	
	• Interface	Communication bus for LMV52	
AGG5.2x0 supply transformer	AGG5.210		
	• Primary side	AC 120 V	
	• Secondary side	12 V~ (3x)	
	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	

Environmental conditions (all LMV5 components)

Storage	EN 60721-3-1:1997
Climatic conditions	Class 1K3
Mechanical conditions	Class 1M2
Temperature range	-20...+60 °C
Humidity	<95% r.h.
Transport	EN 60721-3-2:1997
Climatic conditions	Class 2K2
Mechanical conditions	Class 2M2
Temperature range	-20...+60 °C
Humidity	<95% r.h.
Operation	EN 60721-3-3:1995 + A2:1997
Climatic conditions	Class 3K3
Mechanical conditions	Class 3M3
Temperature range	-20...+60 °C
Humidity	<95% r.h.
Installation altitude	Max. 2,000 m above sea level

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

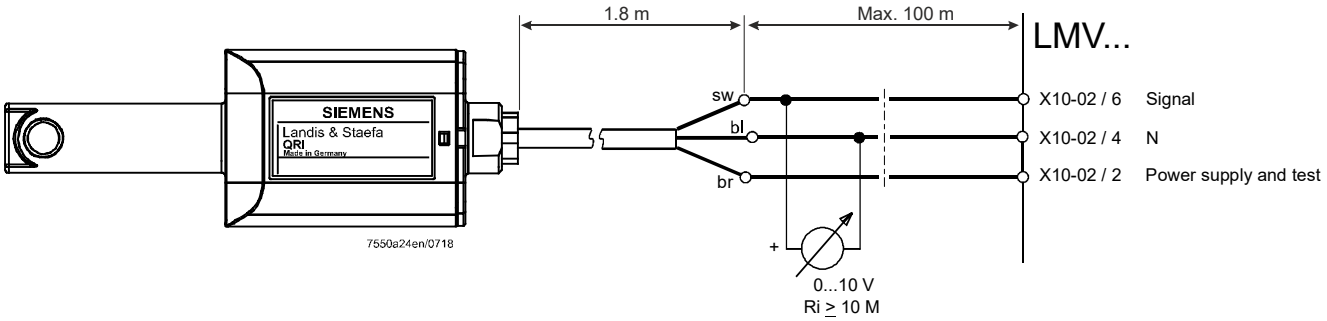
Flame supervision

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

QRI2 infrared flame detector (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 more detailed information about the QRI2 infrared flame detector, refer to data sheet N7719.

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 µA Display flame approx. 50 % (at factory setting of *StandardFactor*) parameter)
Possible detector current	Max. DC 85 µA Display flame approx. 100 % (at factory setting of *StandardFactor*) parameter)
Permissible detector current during extraneous light test	Max. 0.3 µA 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 ≥18%
• Operation	Flame intensity >24%

Ionization current supervision in the LMV5 with 120 V AC

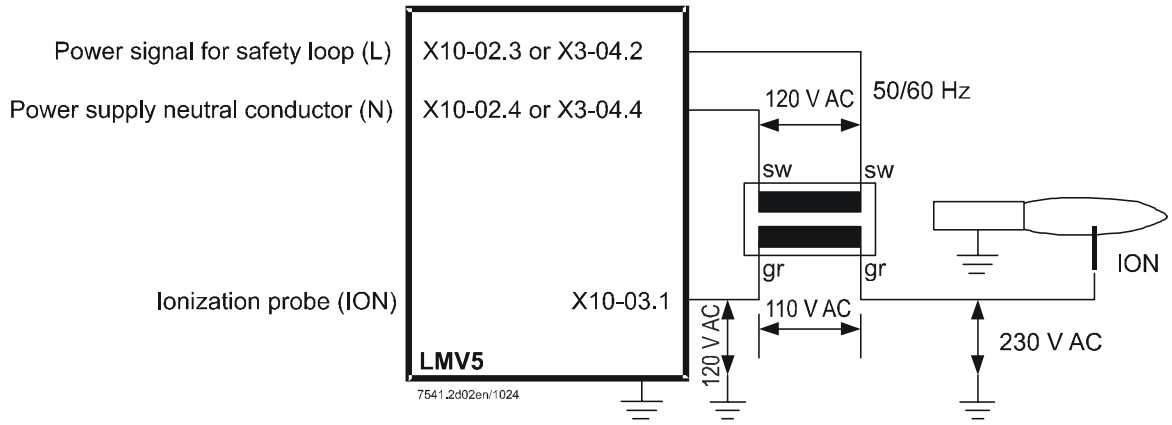
Since the ionization current in the LMV5 with 120 V AC is only about half that of an LMV5 operating on 230 V AC, certain applications make it necessary to increase the ionization current with a transformer.

A5Q20002669 transformer
Article no.: **BPZ:A5Q20002669**
Transformer (V 19734) to increase ionization voltage for LMV5s with 120 V AC

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 in the LMV5 with 120 V AC

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 (≤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 UV flame detector with AGQ1.xA27 UV ancillary unit

For intermittent operation only.

Note!
The AGQ1.xA27 UV ancillary unit is only available for 230 V~ mains power.

Notes
Lifetime of the UV cell
UV cells and the QRA2/QRA4/QRA10 UV flame detector 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 UV flame detector.
For details, refer to chapter 'Technical data' in data sheet N7711 for the QRA4 UV flame detector.

QRA2/QRA4/QRA10 UV flame detector

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

For more detailed information about the QRA2/QRA10 UV flame detector, refer to data sheet N7712.
For more detailed information about the QRA4 UV flame detector, refer to data sheet N7711.

Caution!
The QRA2/QRA4/QRA10 UV flame detector must not be used if extraneous light suppression is set ('ExtranLightTest' = 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

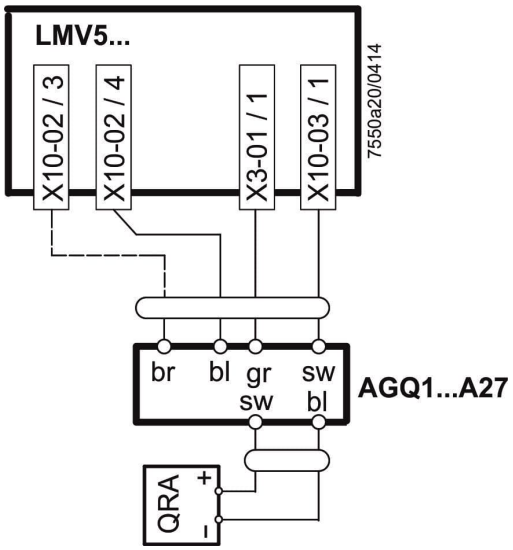
QRA2/QRA4/QRA10 UV flame detector with AGQ1.xA27 UV ancillary unit

AGQ1.xA27 UV ancillary unit

Use of the AGQ1.xA27 UV ancillary unit 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)

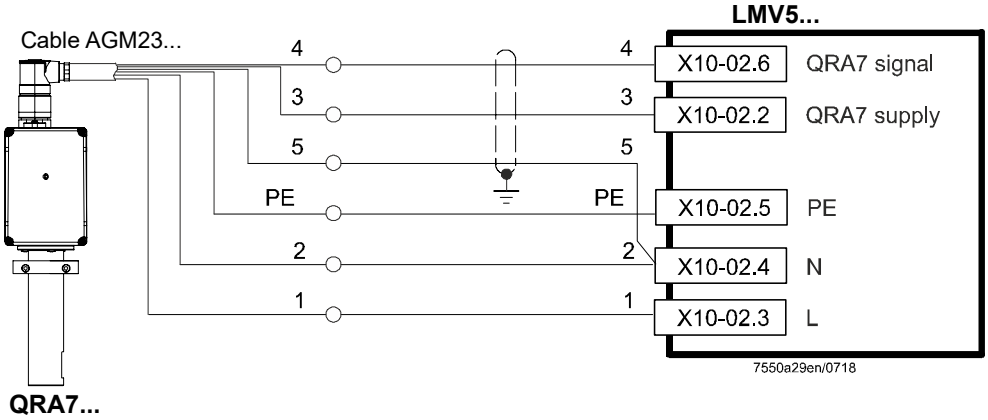
The length of the 2-core cable between the QRA2/QRA4/QRA10 UV flame detector and the AGQ1.xA27 UV ancillary unit must not exceed 20 m when routed together with other cables, e.g. in a cable duct. A maximum cable length of 100 m is permitted if the 2-core cable is run at a distance of at least 5 cm from other live cables. The length of the 4-core cable between the AGQ1.xA27 UV ancillary unit and the 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 UV flame detector
(suited for continuous operation)

Power supply - QRA73A17 / QRA75A17 - QRA73A27 / QRA75A27	 AC 120 V AC 230 V
Supply voltage tested by increasing the supply voltage for the QRA7 UV flame detector (terminal X10-02 pin 2)	From DC 14 V up to DC 21 V
Required signal voltage (terminal 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 • Signal cable no. 3, 4 and 5	 Max. 10 Max. 100 m (lay separately from L, N and PE in shielded cable)

Connection diagram



For more detailed information about the QRA7 UV flame detector, refer to data sheet N7712.

Flame supervision

QRB1/QRB3 photoresistive detector (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 *StandardFactor*) 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 *StandardFactor*) parameter)
Permissible detector cable length for the QRB1/QRB3 photoresistive detector (laid 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 of RF <5 kΩ is identified as a short-circuit and leads to safety shutdown in operation, as in the case of a loss of flame. Measurement of the voltage at the 'QRB1/QRB3' input during burner operation provides a clear indication: if it drops below 1 V, safety shutdowns are likely to occur. For this reason, the necessity of using a highly sensitive QRB1B/QRB3S photoresistive detector must be carefully assessed beforehand.
Increasing line capacitance between the connection of the QRB1/QRB3 photoresistive detector and mains live 'L' reduces sensitivity and increases the risk of detector damage from mains overvoltage. Always run detector cables separately, as specified in data sheet N7714.

For more detailed information about the QRB1/QRB3 photoresistive detector, refer to data sheet N7714.

Caution!
The QRB1/QRB3 photoresistive detector must not be used if extraneous light suppression is set (parameter 'ExtranLightTest' = deactivated), as detector tests will not be carried out in that case.

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

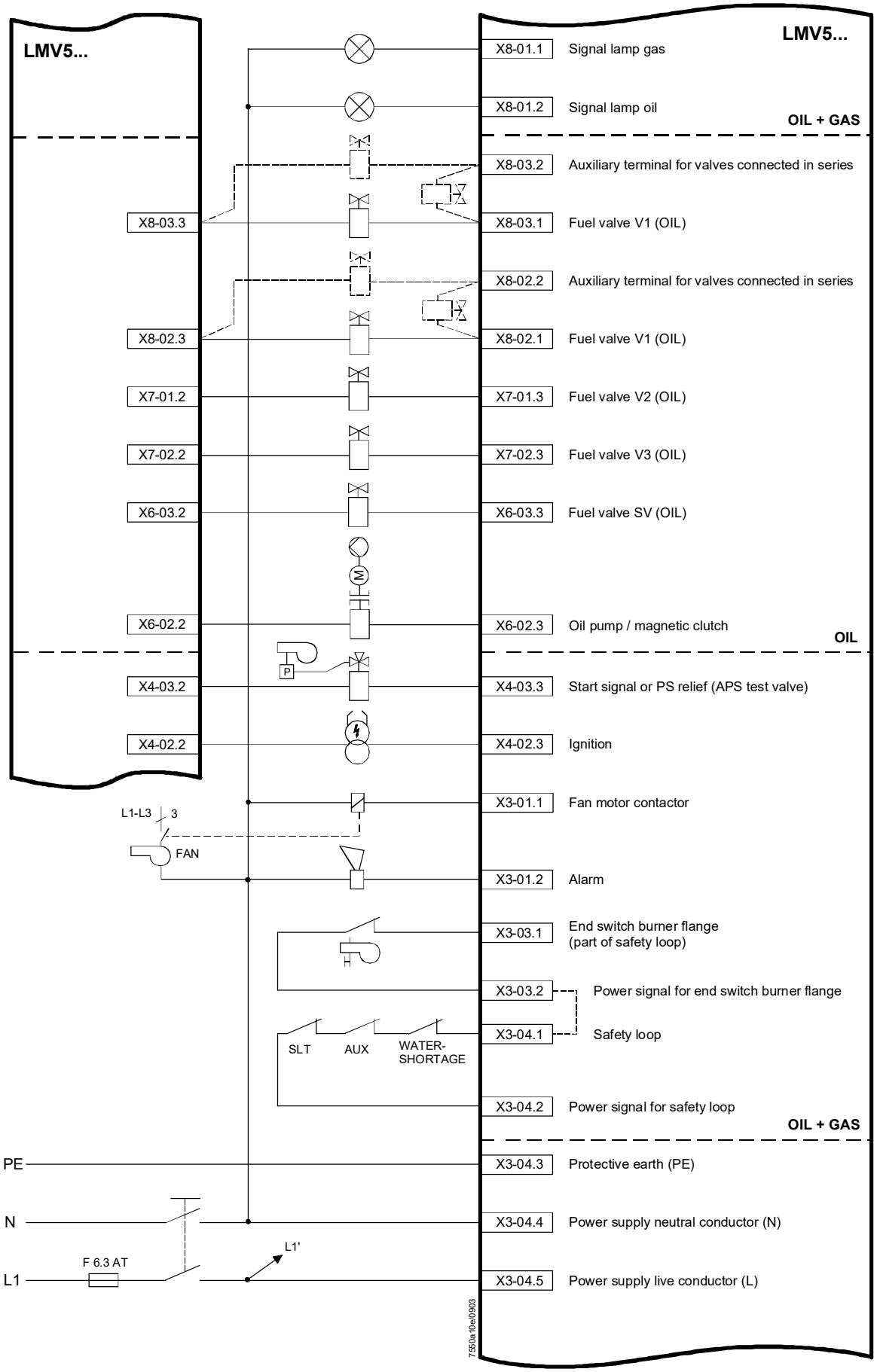
Flame display via AZL52 display and operating unit

For the flame signal display on the AZL52 display and operating unit, 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 ±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.

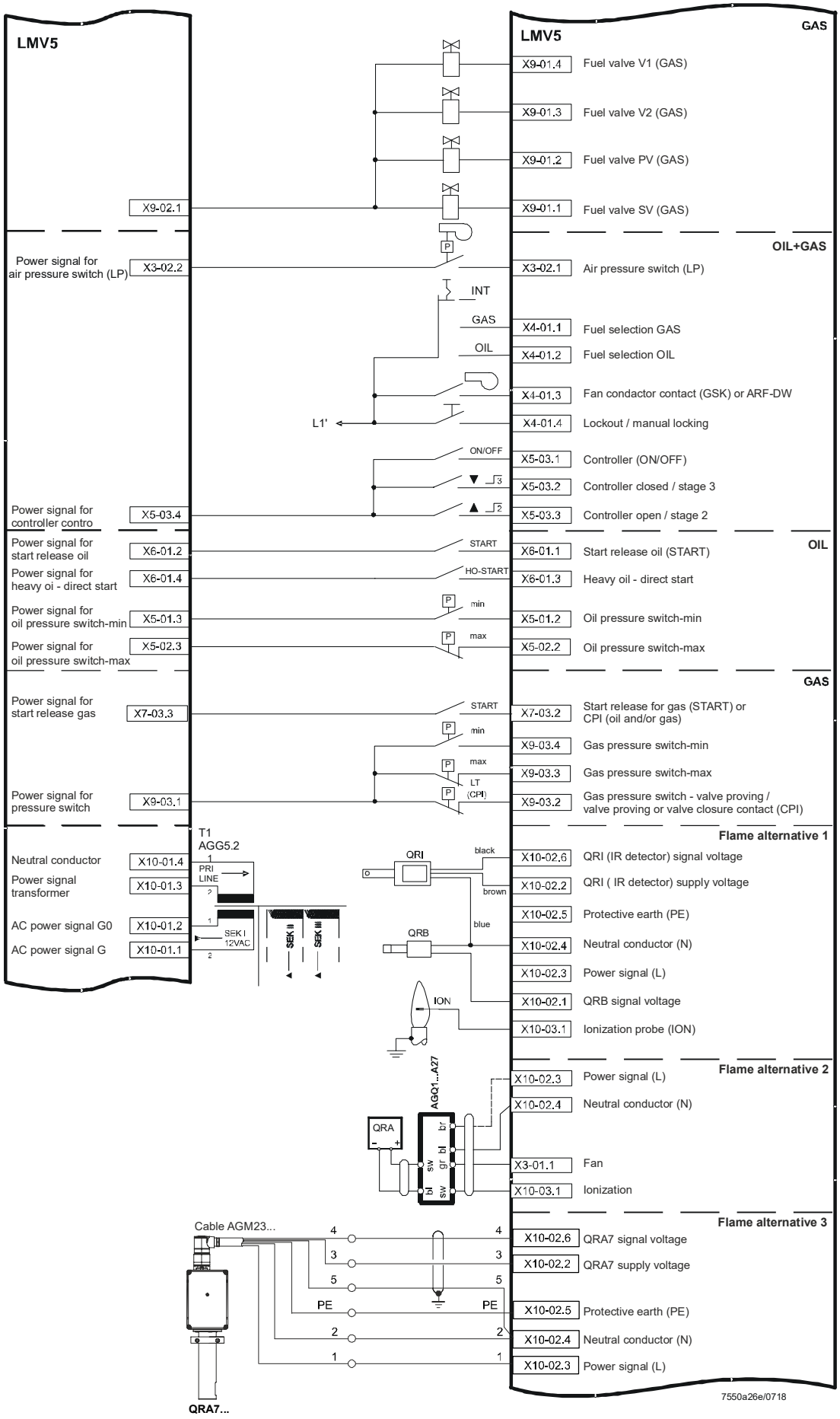
Flame supervision

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 terminal X6-01, pin 3 (HeavyOilDirStart) of the LMV5 input. 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.

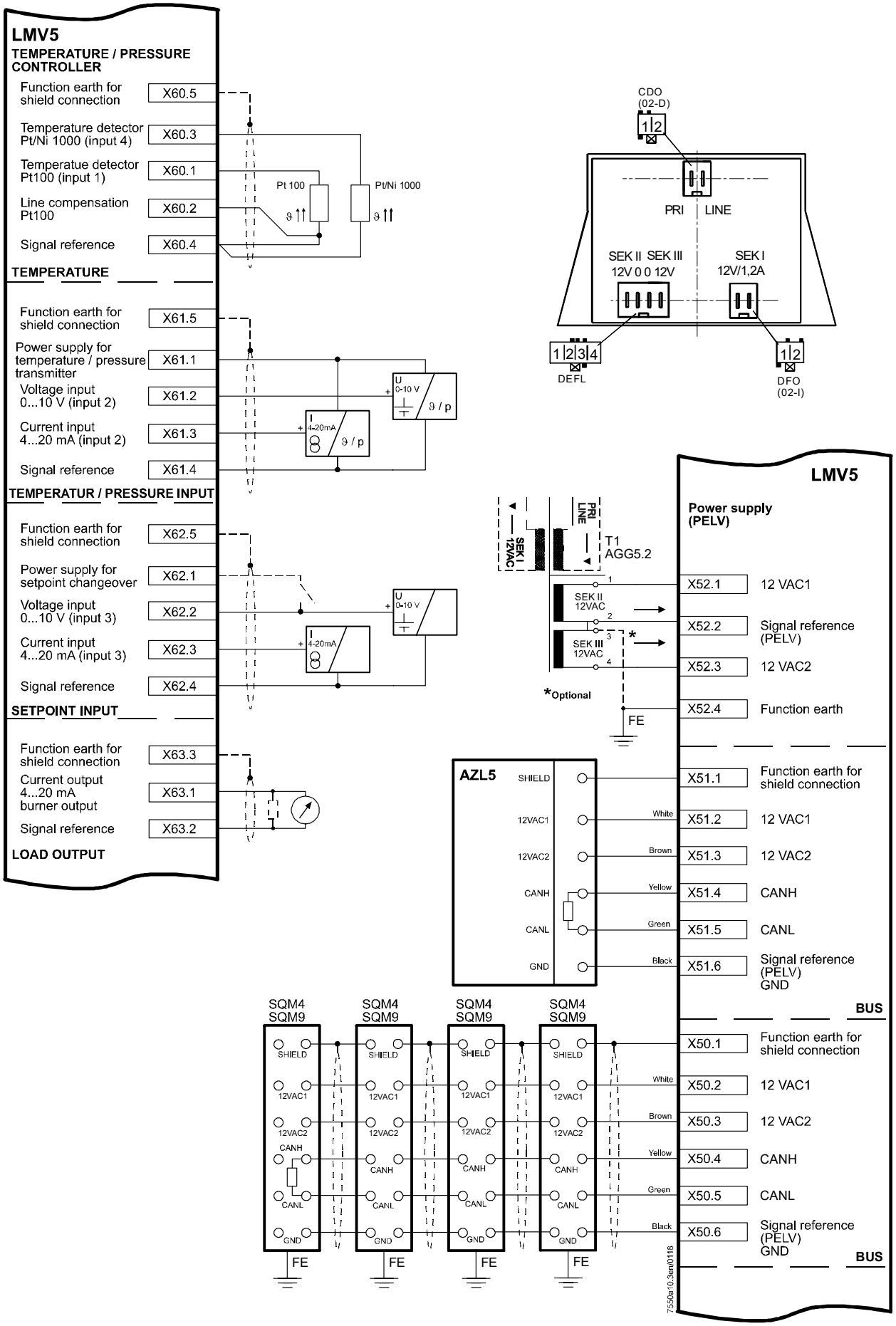
Block diagram inputs / outputs



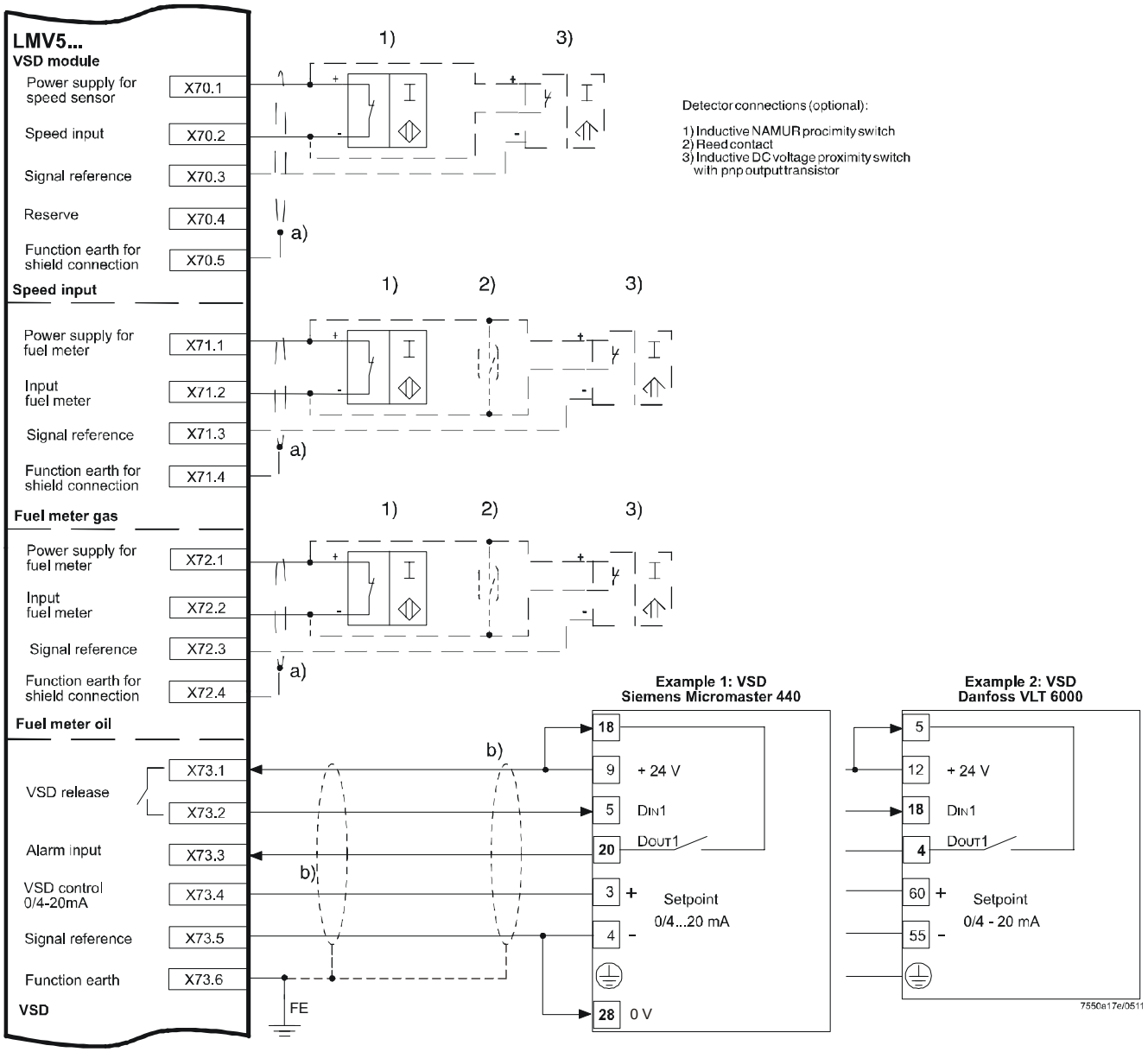
Block diagram inputs / outputs (cont'd)



Block diagram inputs / outputs (cont'd)



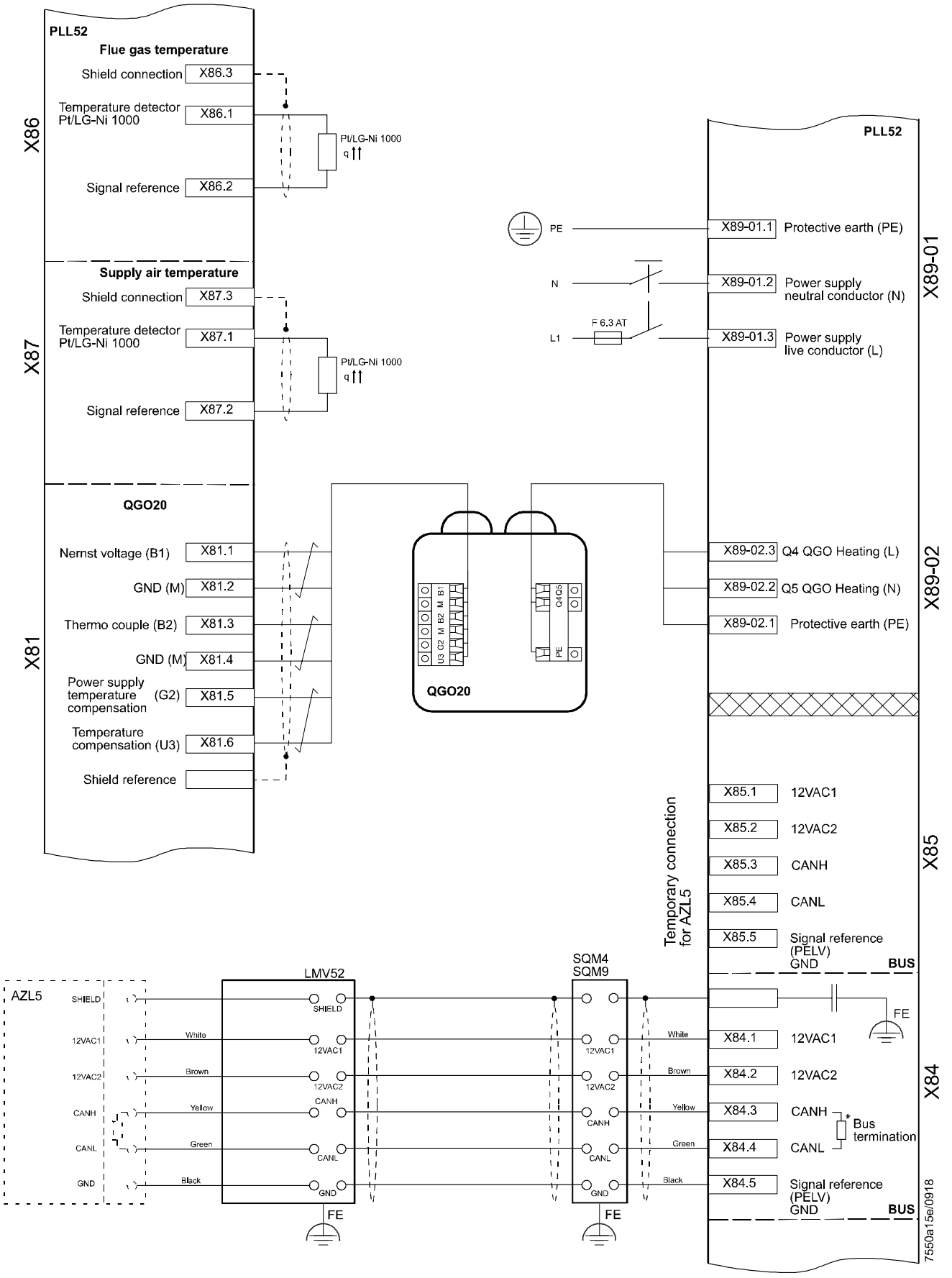
Connection terminals



Shielding:

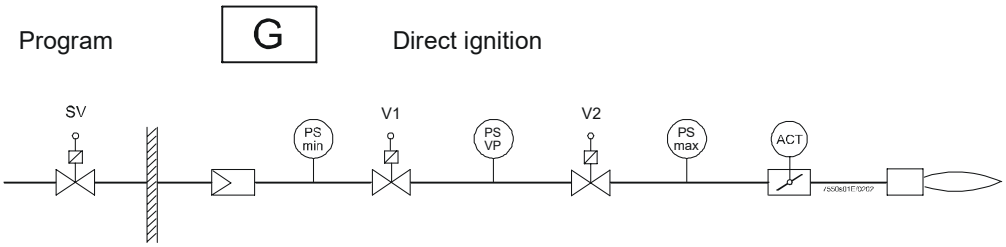
a)	Optional shield connection for rough environmental conditions
b)	Alternative connection of VSD, refer to documentation of used VSD

Terminal markings for LMV52 with PLL52 O2 module

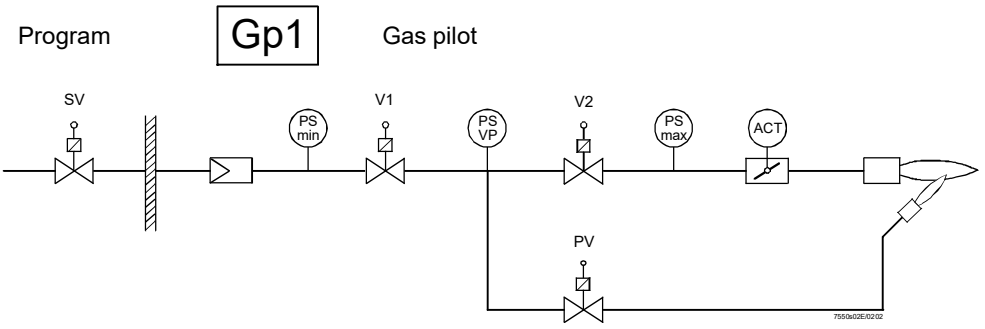


Fuel train (examples)

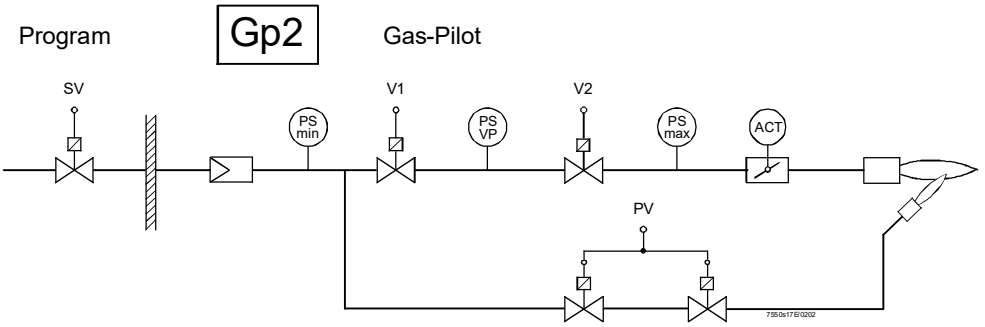
Direct gas ignition



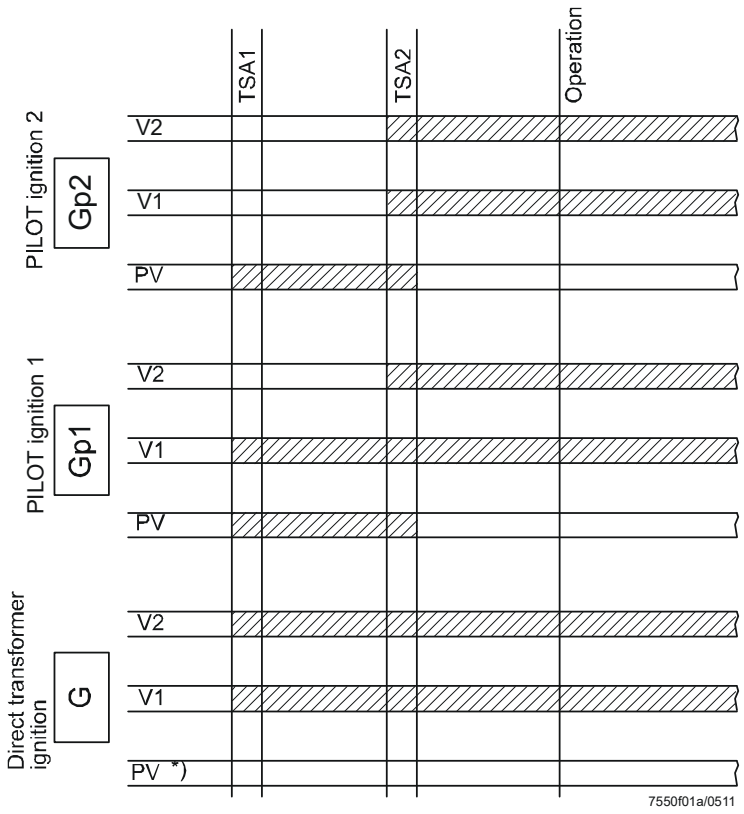
Gas pilot ignition 1



Gas pilot ignition 2



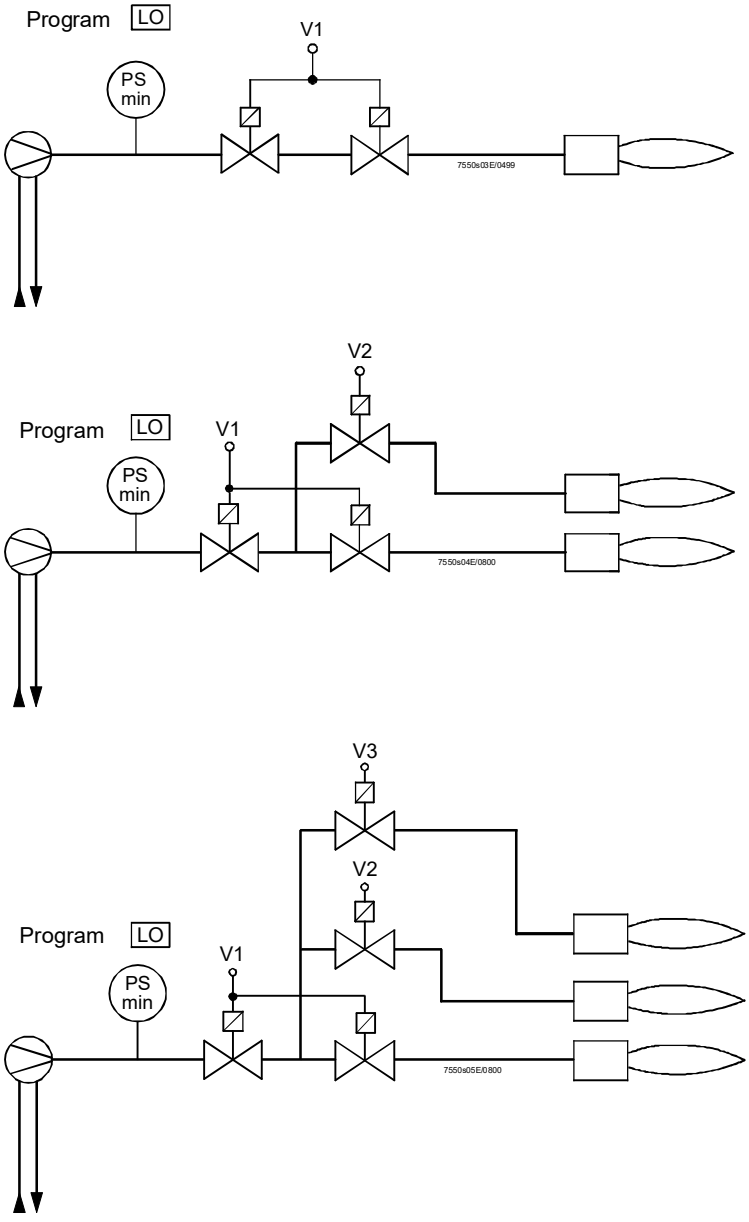
Fuel valve control Gas (always modulating)



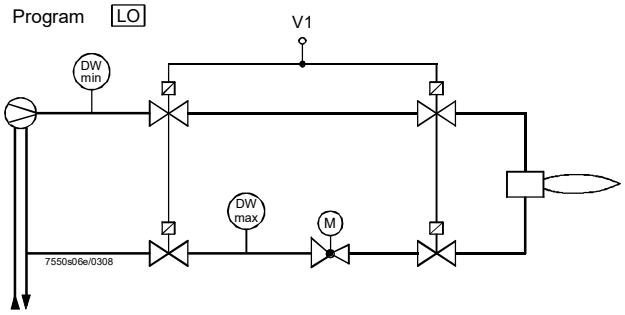
Legend (fuel trains):

*)	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

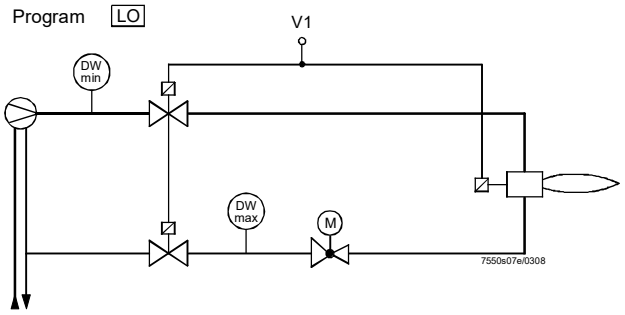
Direct ignition with light oil, multistage



Direct ignition with light oil, modulating



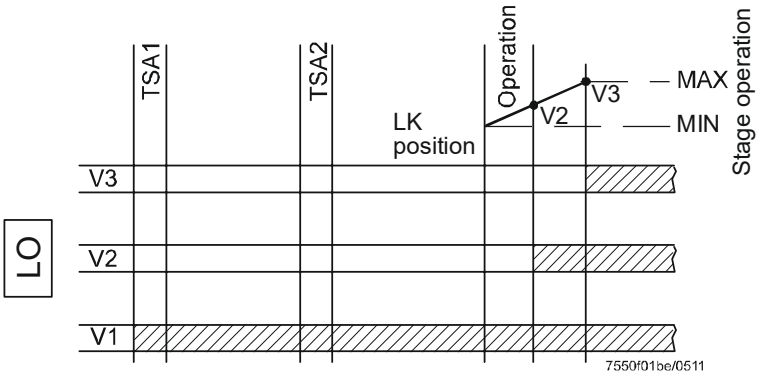
Modulating burner (without shutdown facility for adjustable head)



Modulating burner (with shutdown facility for adjustable head)

Fuel valve control

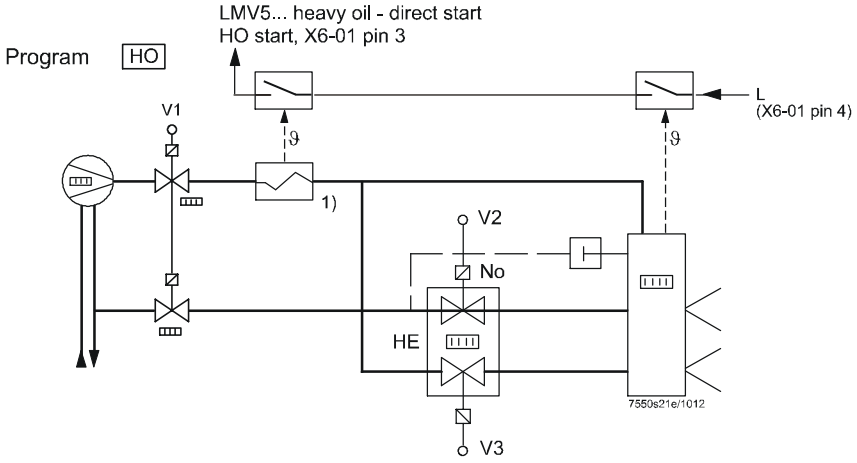
Light oil (direct transformer ignition)



Legend (fuel trains):

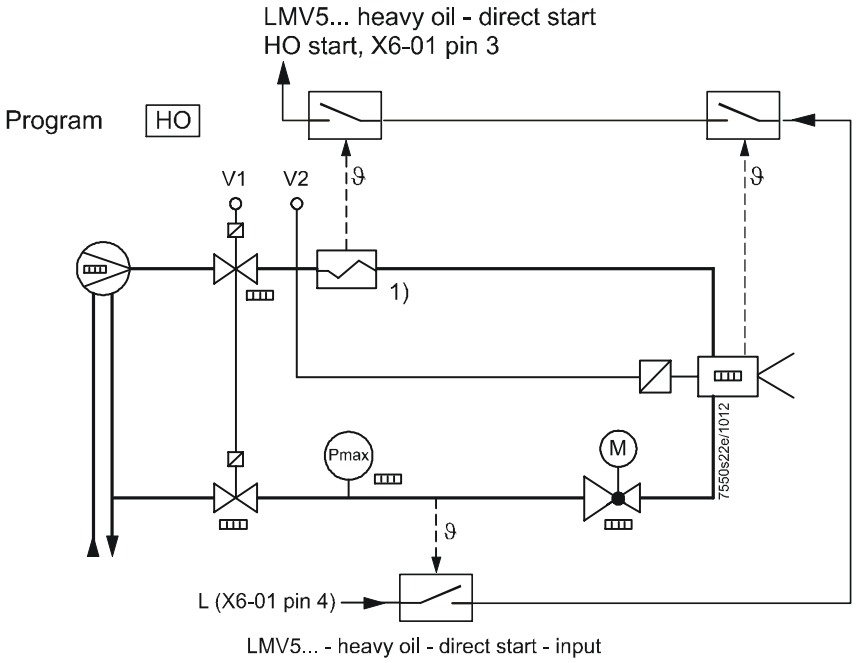
LK	Air damper
LO	Light oil
TSA	Safety time
Vx	Fuel valve

Direct ignition with heavy oil, multistage



2-stage burner

Direct ignition with heavy oil, modulating



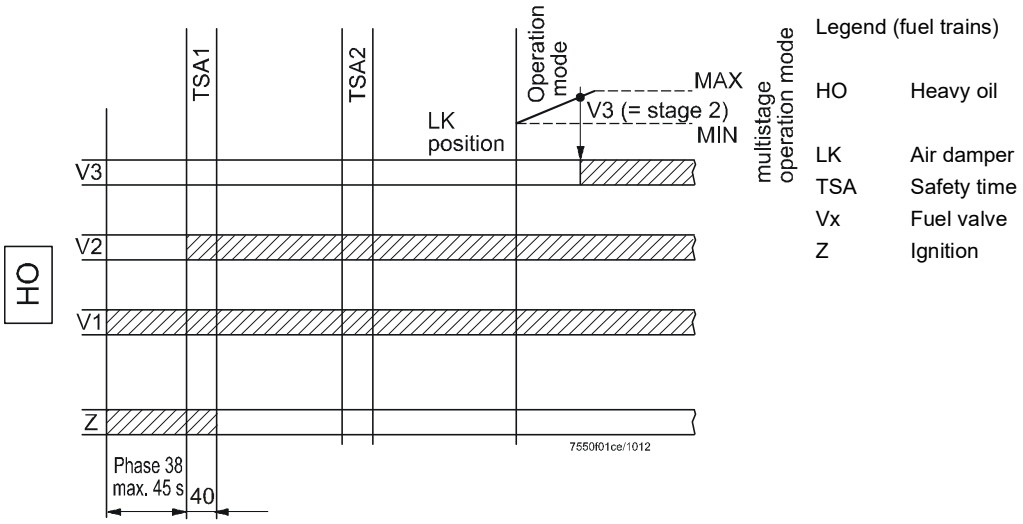
LMV5... - heavy oil - direct start - input

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 valve control — Heavy oil (direct transformer ignition)

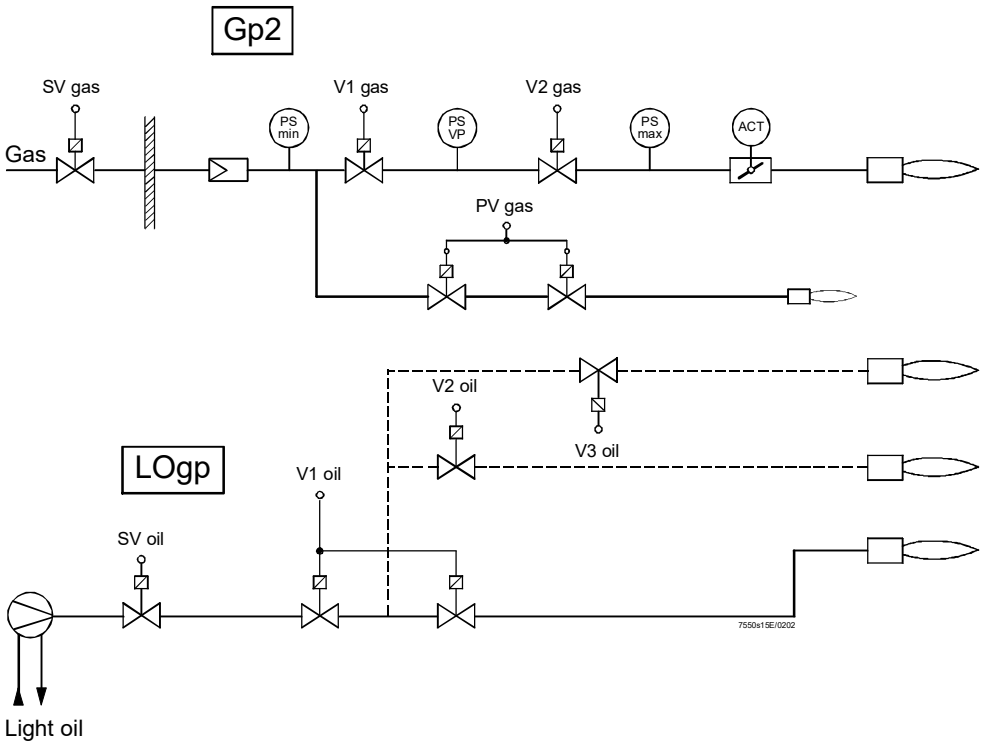


Note on dual-fuel burner!
Gas trains **G**, **Gp1** and **Gp2** [1)] can be randomly combined with oil trains **LO** and **HO** for operation with dual-fuel burners since these fuel trains operate independently.

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.

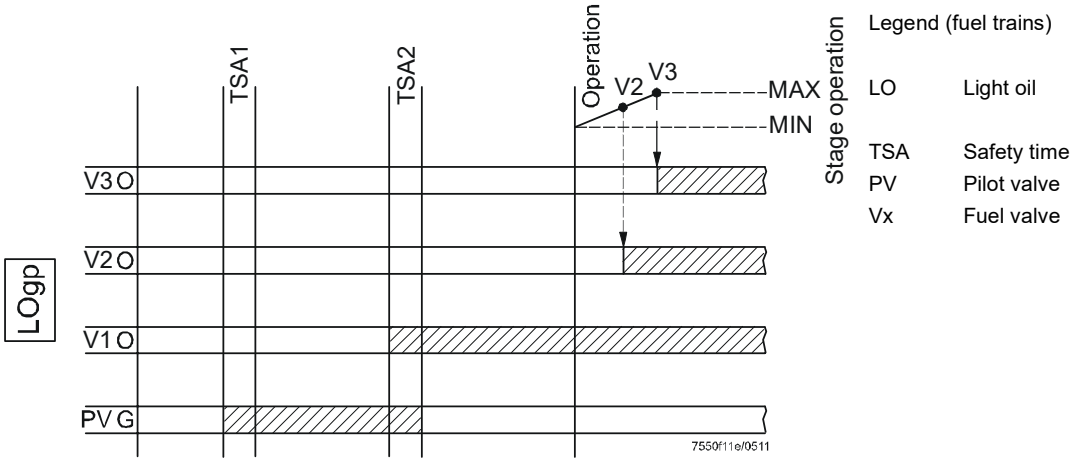
1) With **Gp2** permitted with HW 01.C0, SW V01.40 or higher.

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

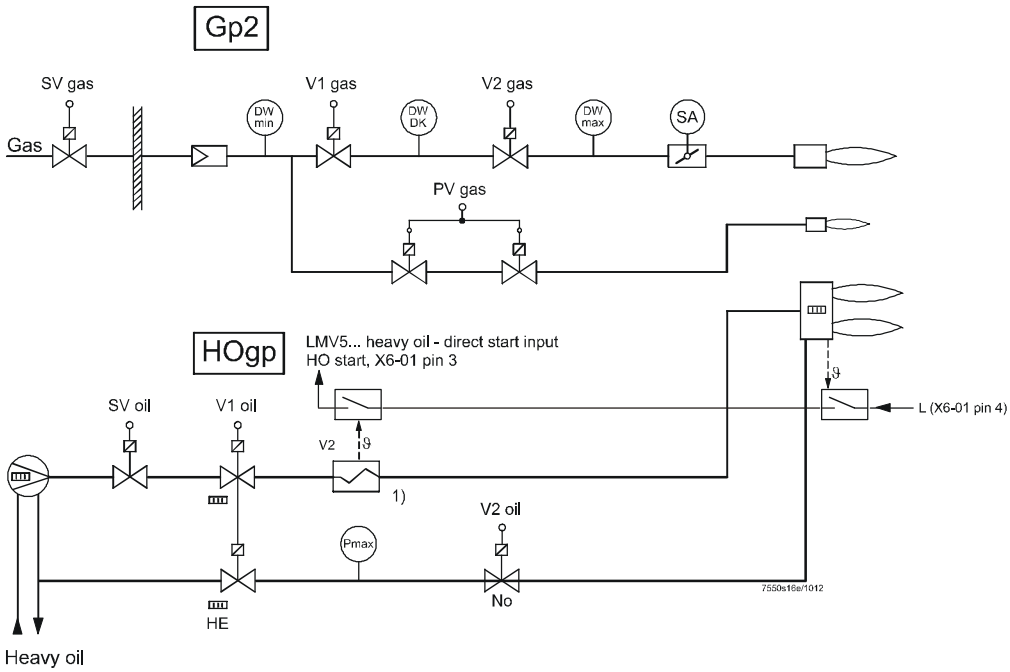


Fuel valve control

Light oil (with gas pilot ignition)

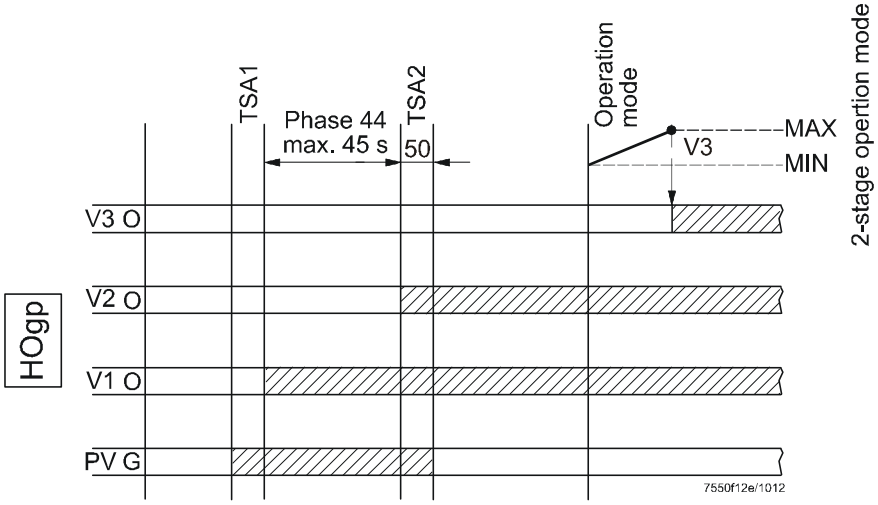


Dual-fuel burner gas / heavy oil with gas pilot ignition



Fuel valve control

Heavy oil (with gas pilot ignition)



Legend (fuel trains):

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

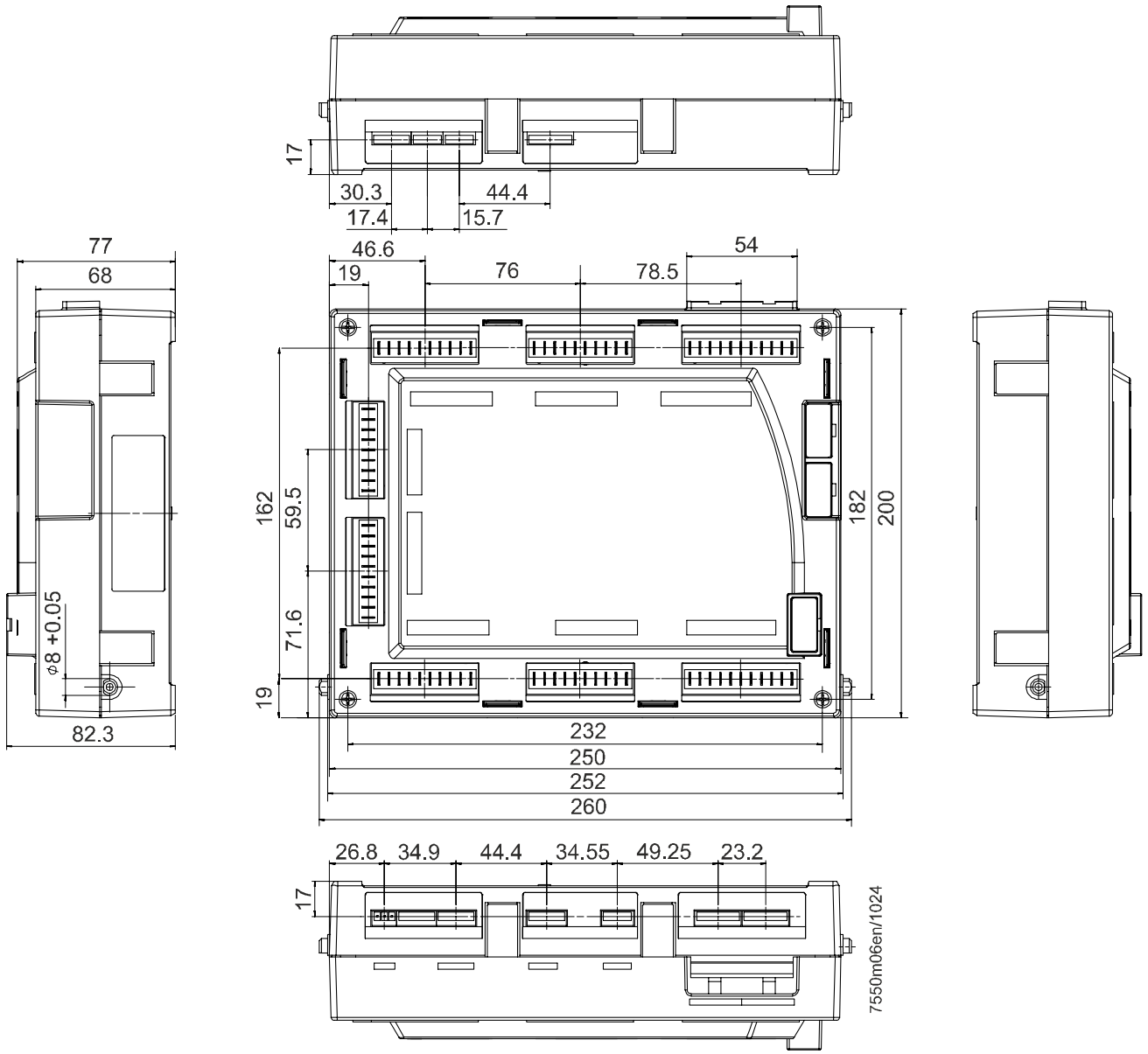
Circulation from phase 44, max. 45 s as soon as heavy oil direct start = ON in phase 44:
→ phase change in phase 50

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

Dimensions

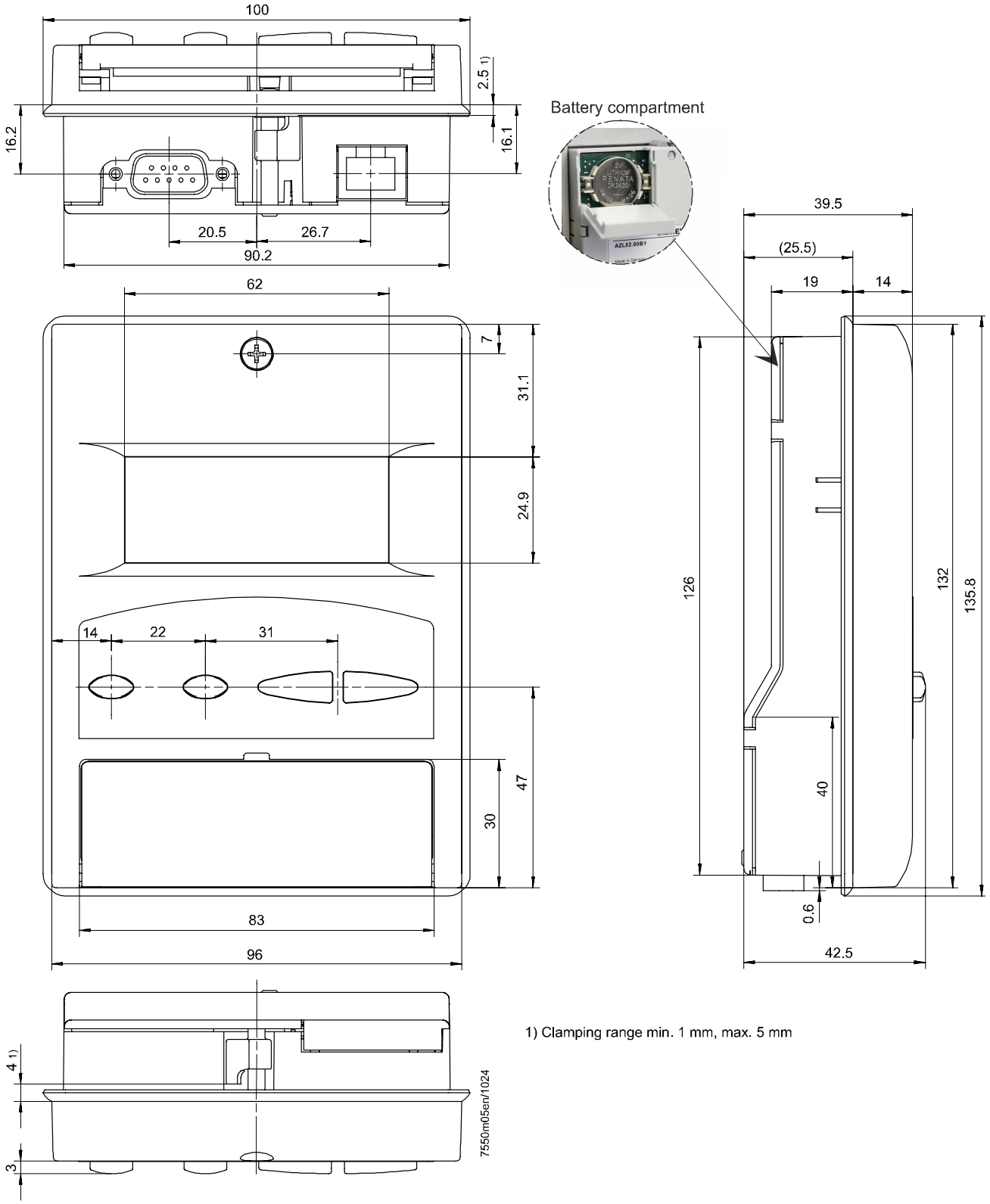
Dimensions in mm

LMV5



Dimensions in mm

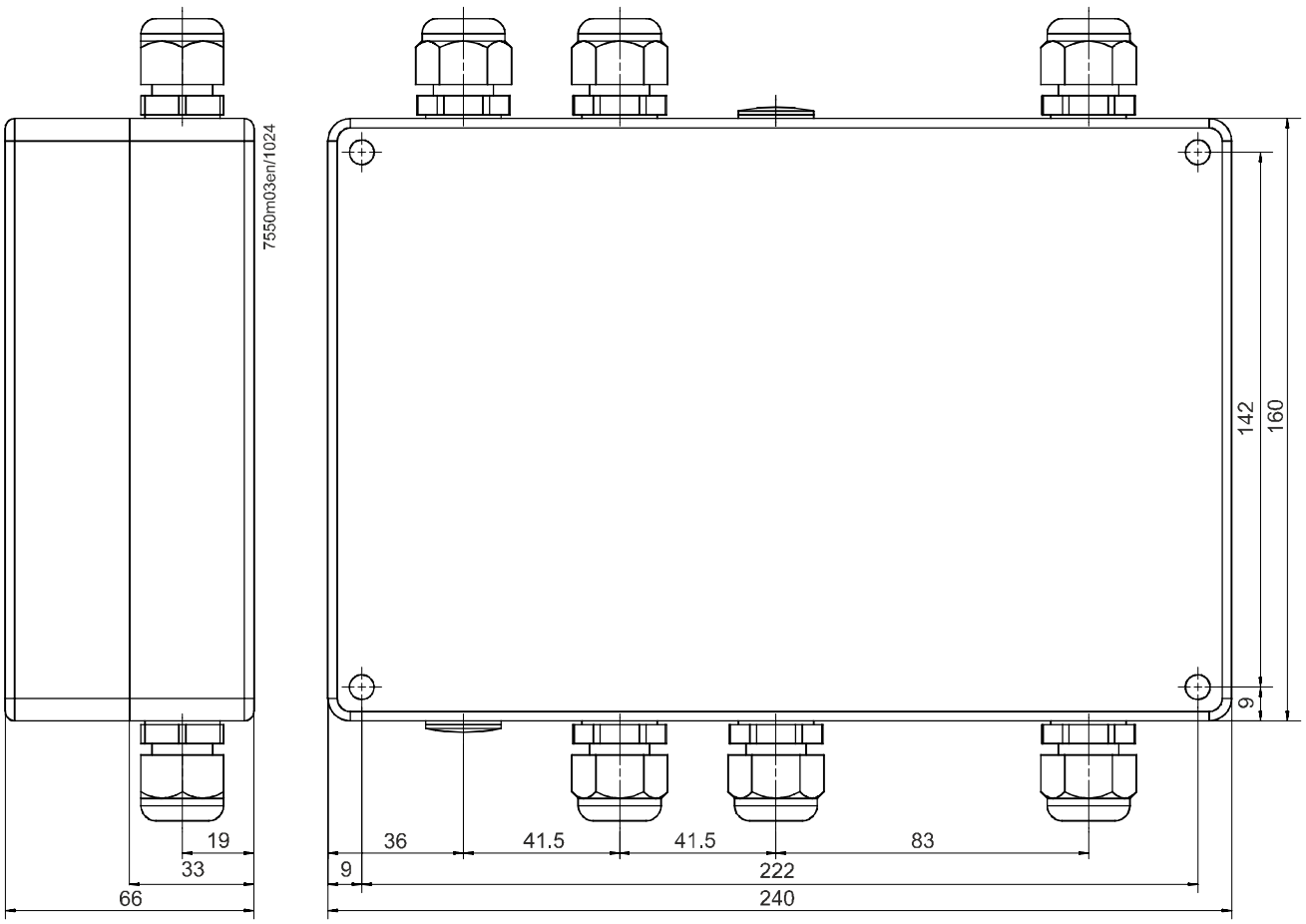
AZL52 display and
operating unit



1) Clamping range min. 1 mm, max. 5 mm

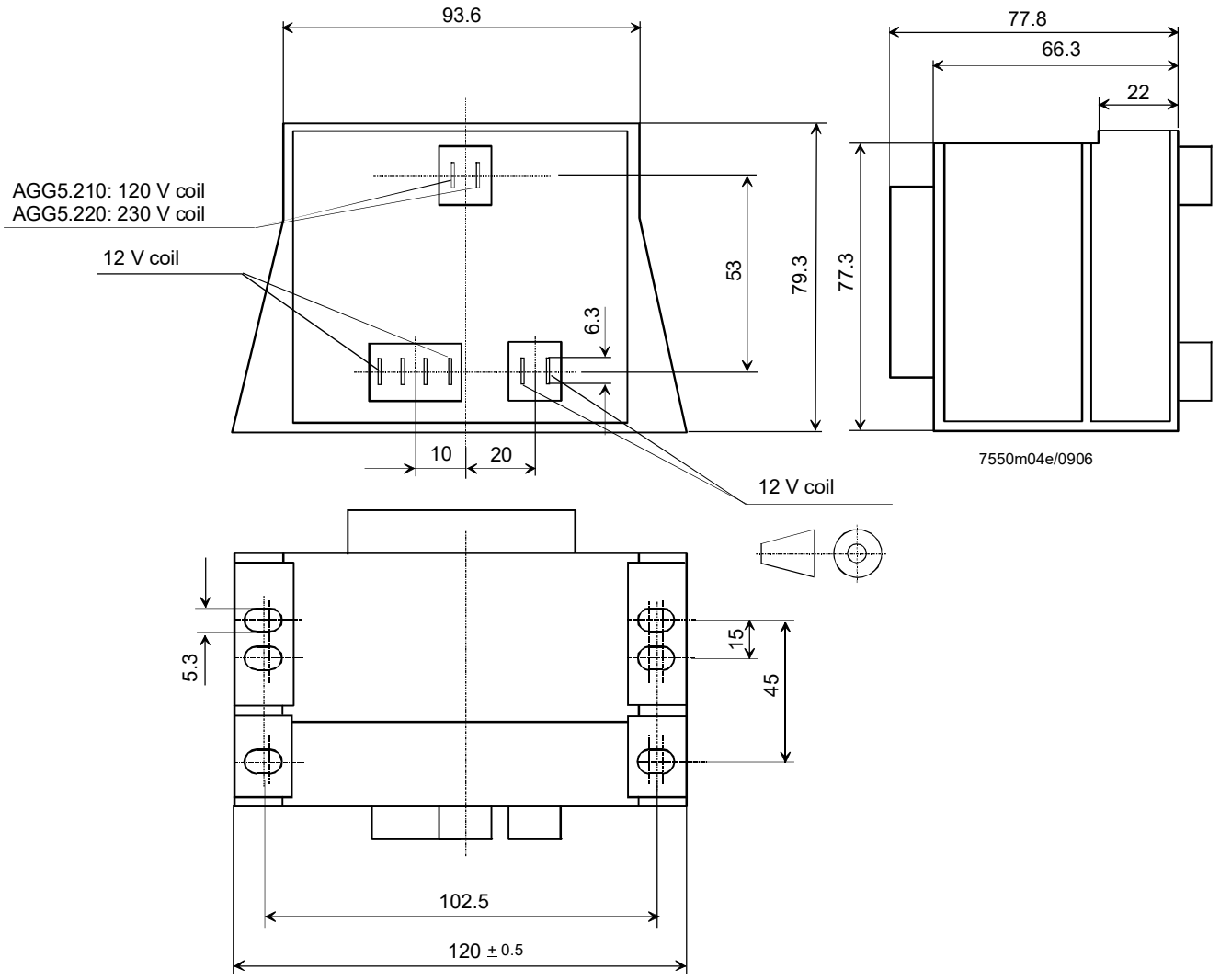
Dimensions in mm

PLL52 O2 module



Dimensions in mm

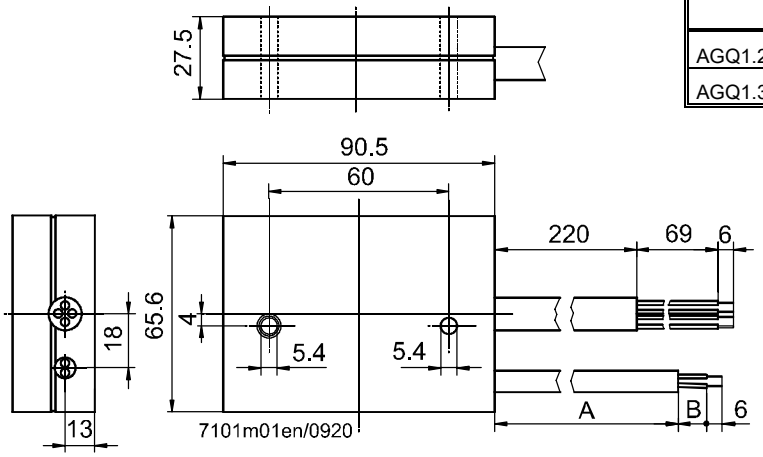
AGG5.210 / AGG5.220
supply transformer



Dimensions in mm

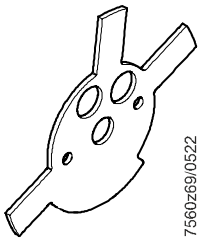
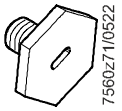
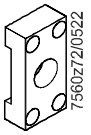
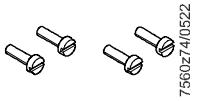
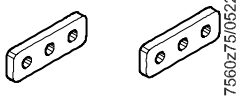
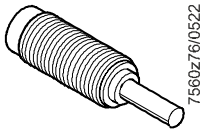
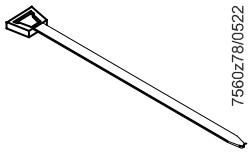
AGQ1.xA27 UV ancillary unit

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



AGG5.310 / AGG5.315 mounting kit

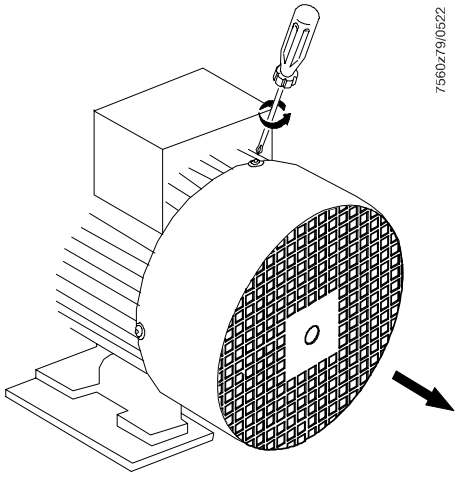
Scope of delivery

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.

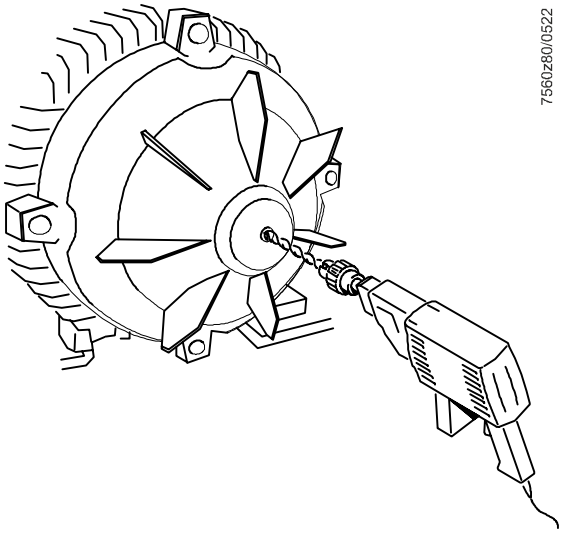

7560z79/0522

Motor example

Remove the protective hood of the motor.

Maximum thickness of the protective grating: 2 mm.

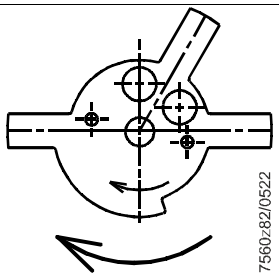
Step 2



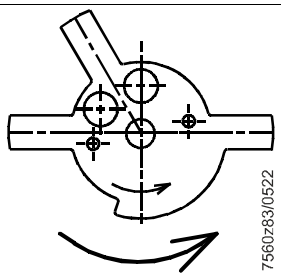
Motor example

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

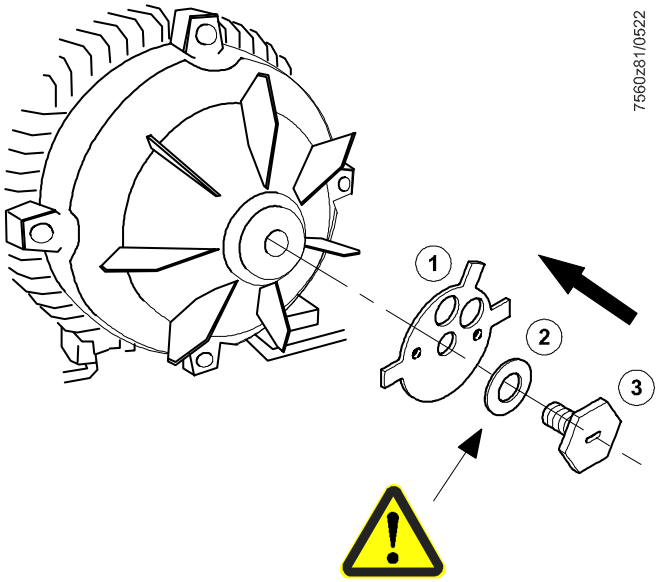
Step 3



Direction of motor rotation



Direction of motor rotation



Motor example

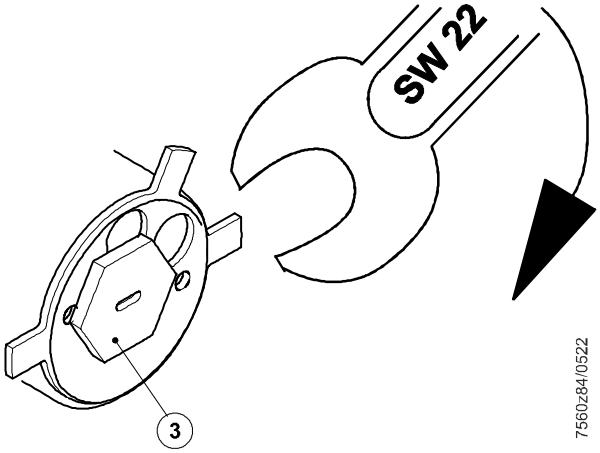
- Mount the sensor disk ① observing the direction of motor rotation (refer to figure above)

  AGG5.310 mounting kit:
  Small speed sensor disk (∅ 50 mm) for shaft diameter 15…50 mm

  AGG5.315 mounting kit (on request):
  Large speed sensor disk (∅ 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

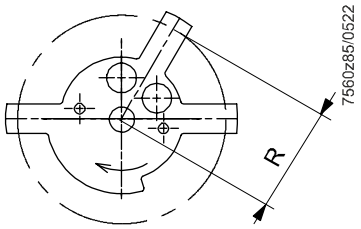
Step 4



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

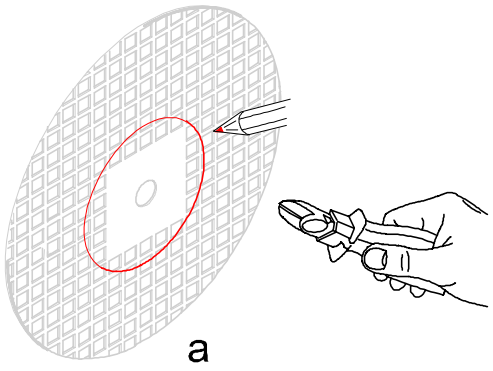
Torque:
Min. 3 Nm
Max. 6 Nm

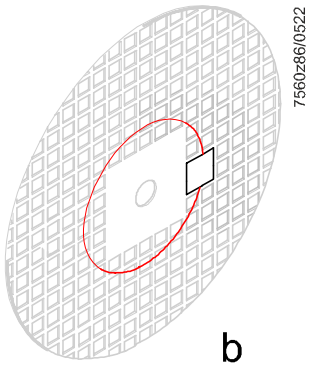
Step 5



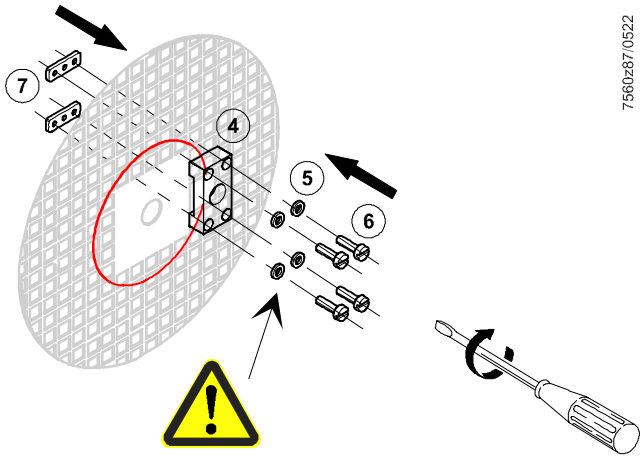
Small speed sensor disk: R = 41 mm
Large speed sensor disk: R = 51 mm

- 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





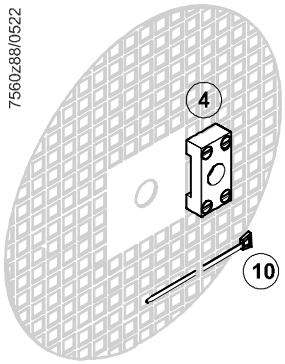
Step 6



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.

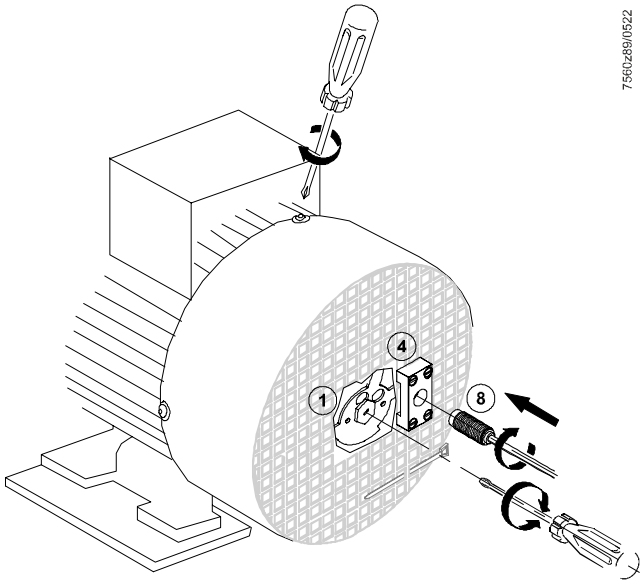
Step 7



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.

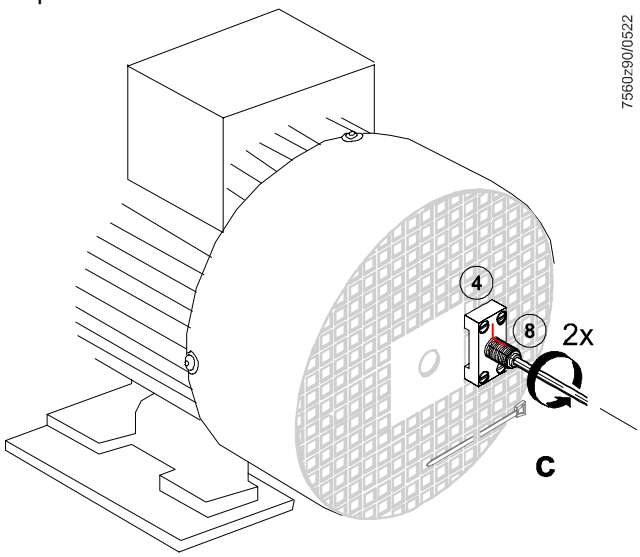
Step 8



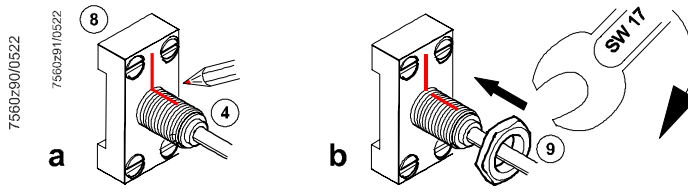
Motor example

- 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



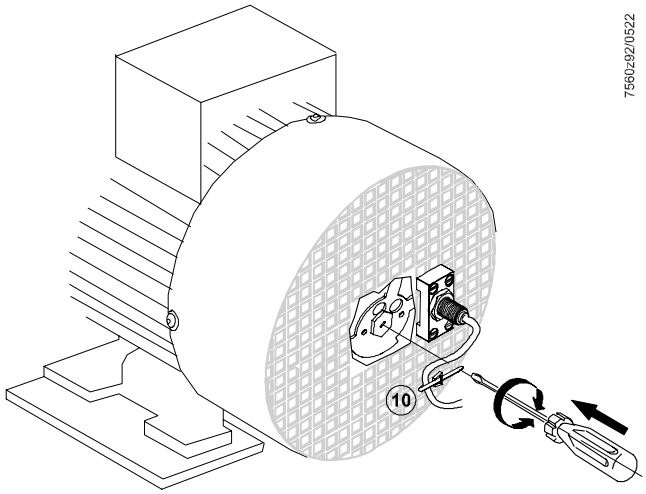
Motor example



- 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 ± 0.1 mm
- Then secure the sensor ④ with the locknut ⑨ using a wrench (width across flats: 17) (refer to figure **b**)

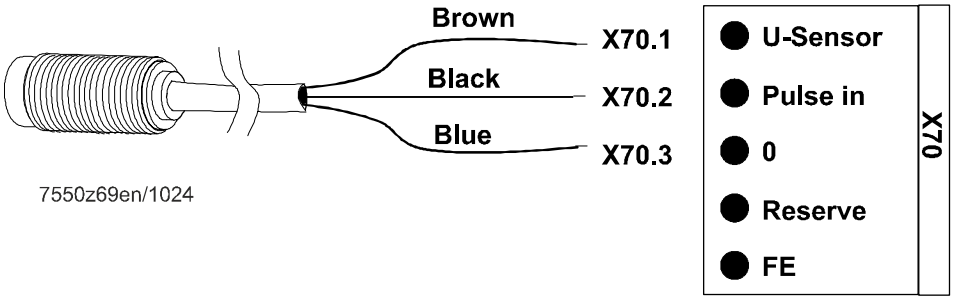
Mounting instructions for the speed sensor (cont'd)

Step 10



Motor example

- 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



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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.