SIEMENS

7550.1

Installation Guide for LMV5... System

Observe safety notes given in Basic Documentation P7550!

Contents

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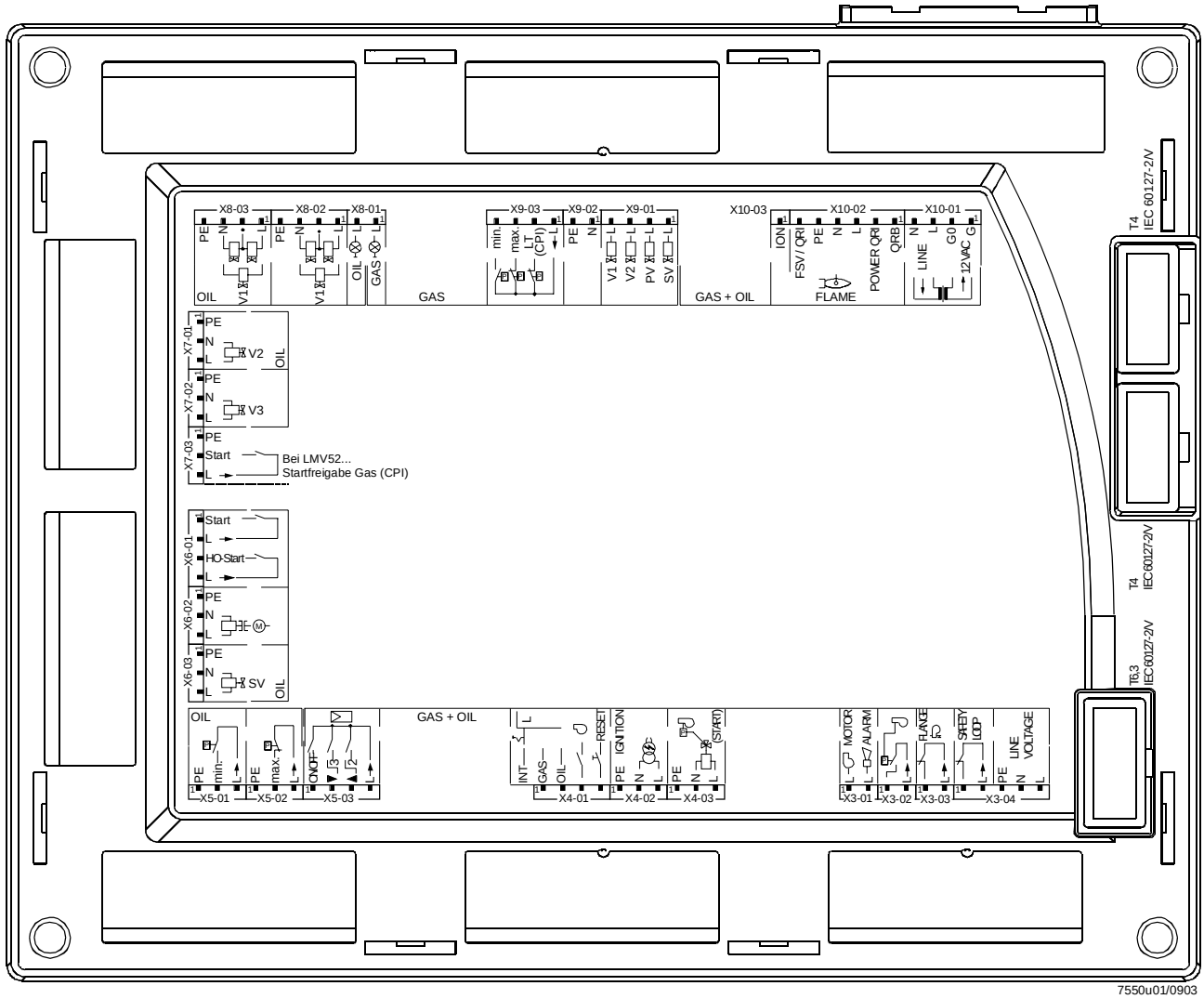
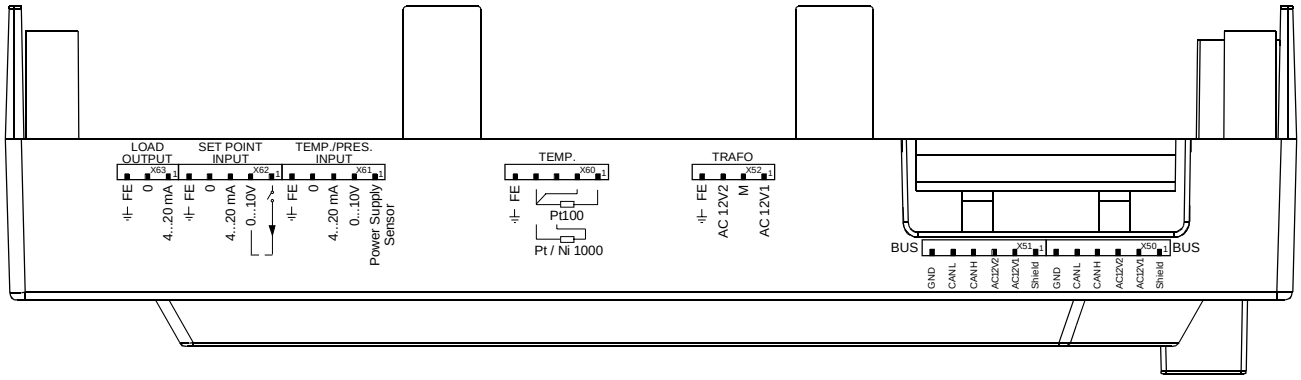
Building Technologies
HVAC Products

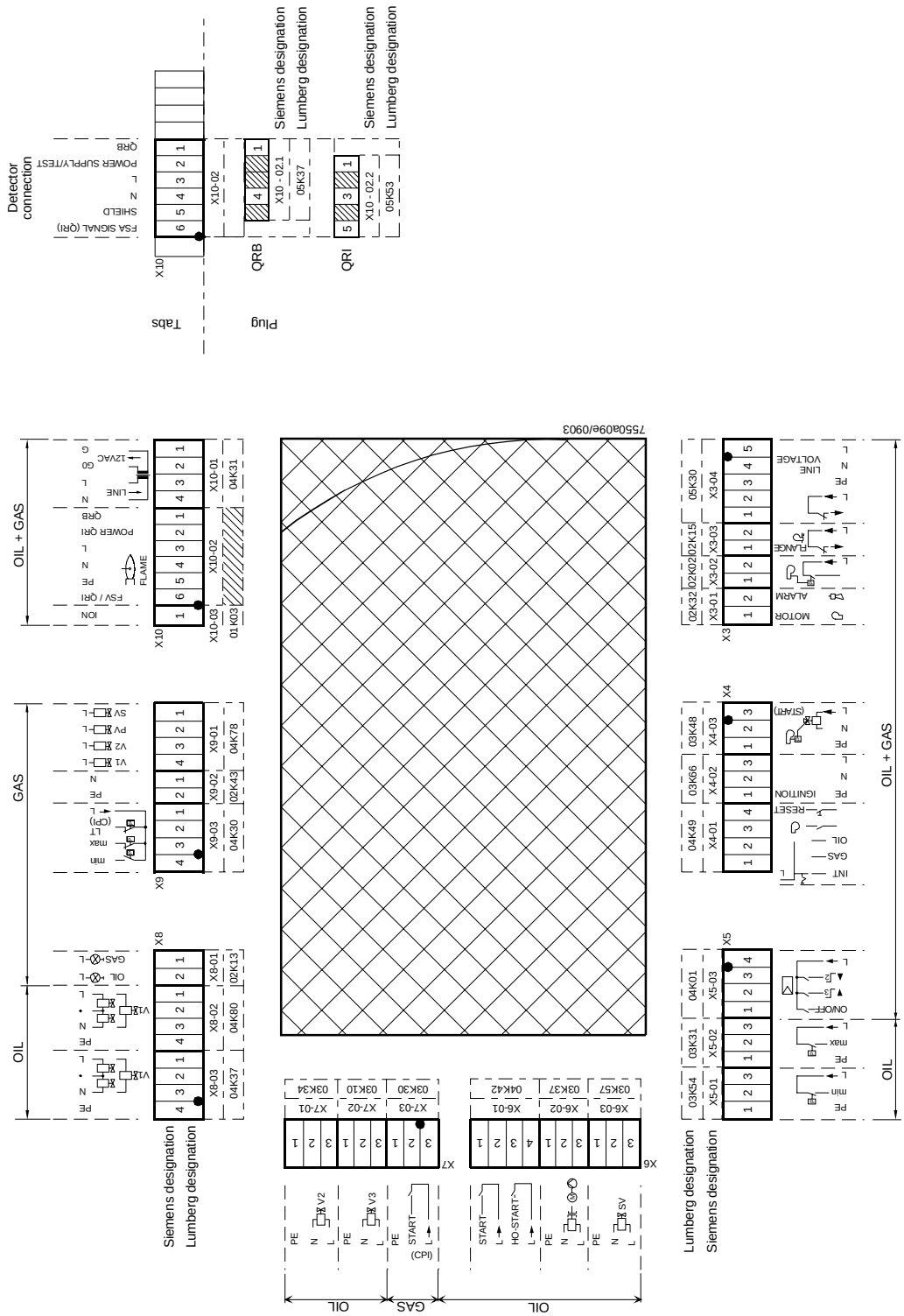
1. Connection terminals / coding of connectors

1.1 Connection terminals of the LMV5...



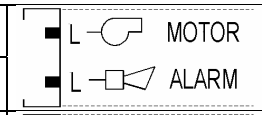
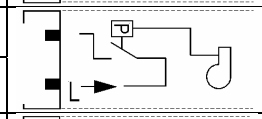
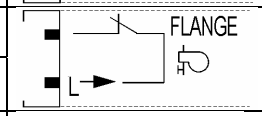
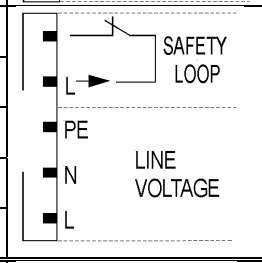
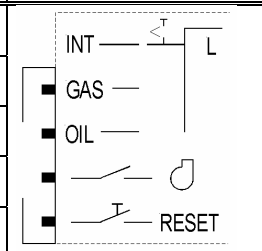
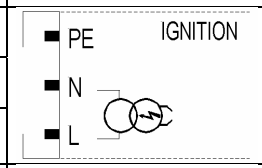
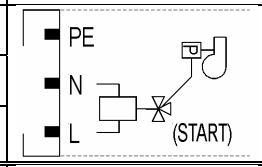
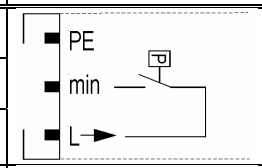
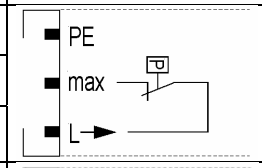
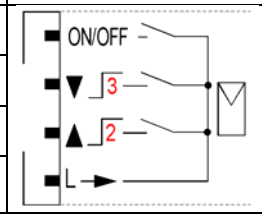


1.2 Coding of connectors

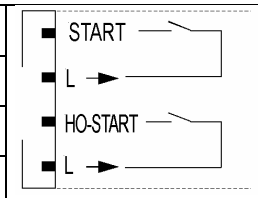
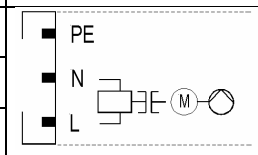
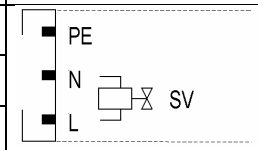
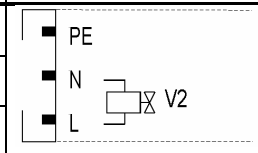
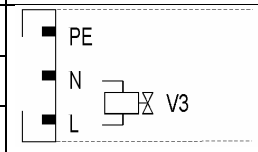
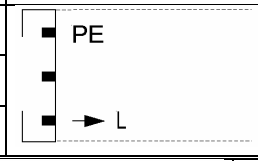
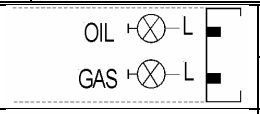
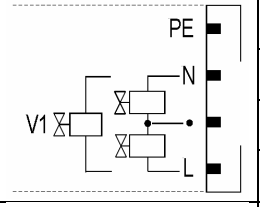
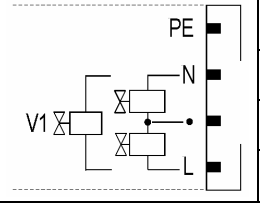


2. Description of the connection terminals

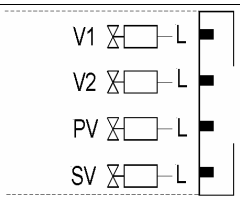
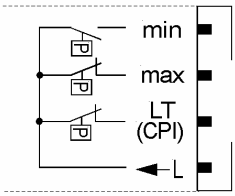
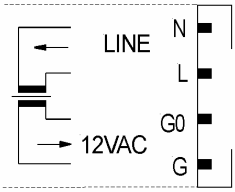
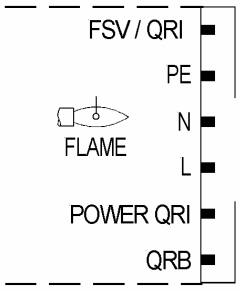
Contact material for external transmitter (LP, DWmin, DWmax., etc.) → gold-plated silver contacts

Terminal marking	Connection symbol		In-put	Out-put	Description	Electrical rating
X3-01	PIN1			x	Fan motor contactor	AC 230 V +10 % / -15 %, 50...60 Hz, 1 A, cosφ 0.4
	PIN2			x	Alarm	AC 230 V +10 % / -15 %, 50...60 Hz, 1 A, cosφ 0.4
X3-02	PIN1		x		Air pressure switch (LP)	AC 230 V +10 % / -15 %, 50...60 Hz, Imax 1.5 mA
	PIN2			x	Power signal for air pressure switch (LP)	AC 230 V +10 % / -15 %, 50...60 Hz, Imax 500 mA
X3-03	PIN1		x		End switch burner flange	AC 230 V +10 % / -15 %, 50...60 Hz, Imax 5 A
	PIN2			x	Power signal for end switch burner flange	AC 230 V +10 % / -15 %, 50...60 Hz, Imax 5 A
X3-04	PIN1		x		Safety loop	AC 230 V +10 % / -15 %, 50...60 Hz, Imax 5 A
	PIN2			x	Power signal for safety loop	AC 230 V +10 % / -15 %, 50...60 Hz, Imax 5 A
	PIN3		x		Protective earth (PE)	
	PIN4		x		Neutral conductor (N)	
	PIN5		x		Live conductor (L)	AC 230 V +10 % / -15 %, 50...60 Hz, fuse 6.3 AT (DIN EN 60 127 2 / 5)
X4-01					Fuel selection „internal“ if pin 1-2 is not used	
	PIN1		x		Fuel selection gas	AC 230 V +10 % / -15 %, 50...60 Hz, Imax 1.5 mA
	PIN2		x		Fuel selection oil	AC 230 V +10 % / -15 %, 50...60 Hz, Imax 1.5 mA
	PIN3		x		Fan contactor contact (FCC) or FGR-PS	AC 230 V +10 % / -15 %, 50...60 Hz, Imax 1.5 mA
	PIN4		x		Reset / manual lockout	AC 230 V +10 % / -15 %, 50...60 Hz, Imax 1.5 mA
X4-02	PIN1			x	Protective earth (PE)	
	PIN2			x	Neutral conductor (N)	
	PIN3			x	Ignition	AC 230 V +10 % / -15 %, 50...60 Hz, 2 A, cosφ 0.2
X4-03	PIN1			x	Protective earth (PE)	
	PIN2			x	Neutral conductor (N)	
	PIN3			x	Start signal or PS relief (APS test valve)	AC 230 V +10 % / -15 %, 50...60 Hz, 0.5 A, cosφ 0.4
X5-01	PIN1			x	Protective earth (PE)	
	PIN2		x		Pressure switch min-oil (DWmin-oil)	AC 230 V +10 % / -15 %, 50...60 Hz, Imax 1.5 mA
	PIN3			x	Power signal for pressure switch-min-oil (DWmin-oil)	AC 230 V +10 % / -15 %, 50...60 Hz, Imax 500 mA
X5-02	PIN1			x	Protective earth (PE)	
	PIN2		x		Pressure switch-max-oil (DWmax-oil)	AC 230 V +10 % / -15 %, 50...60 Hz, Imax 1.5 mA
	PIN3			x	Power signal for pressure switch-max-oil (DWmax-oil)	AC 230 V +10 % / -15 %, 50...60 Hz, Imax 500 mA
X5-03	PIN1		x		Controller	AC 230 V +10 % / -15 %, 50...60 Hz, Imax 1.5 mA
	PIN2		x		Controller closes / stage 3	AC 230 V +10 % / -15 %, 50...60 Hz, Imax 1.5 mA
	PIN3		x		Controller opens / stage 3	AC 230 V +10 % / -15 %, 50...60 Hz, Imax 1.5 mA
	PIN4			x	Power signal for control of controller	AC 230 V +10 % / -15 %, 50...60 Hz, Imax 500 mA

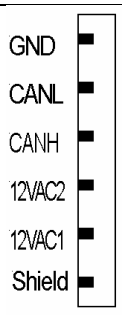
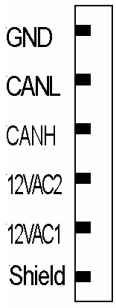
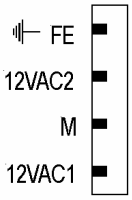
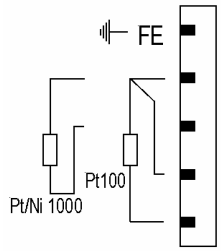
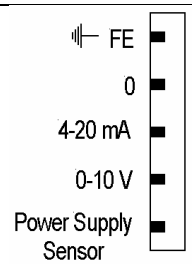
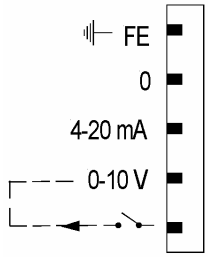
Description of the connection terminals (cont'd)

Terminal marking	Connection symbol		Input	Output	Description	Electrical rating
X6-01	PIN1		x		Start release oil	AC 230 V +10 % / -15 %, 50...60 Hz, Imax 1.5 mA
	PIN2			x	Power signal start release oil	AC 230 V +10 % / -15 %, 50...60 Hz, Imax 500 mA
	PIN3		x		Direct heavy oil start	AC 230 V +10 % / -15 %, 50...60 Hz, Imax 1.5 mA
	PIN4			x	Power signal direct heavy oil start	AC 230 V +10 % / -15 %, 50...60 Hz, Imax 500 mA
X6-02	PIN1			x	Protective earth (PE)	
	PIN2			x	Neutral conductor (N)	
	PIN3			x	Oil pump / magnetic coupling	AC 230 V +10 % / -15 %, 50...60 Hz, 2 A, cosφ 0.4
X6-03	PIN1			x	Protective earth (PE)	
	PIN2			x	Neutral conductor (N)	
	PIN3				Fuel valve SV (oil)	AC 230 V +10 % / -15 %, 50...60 Hz, 1 A, cosφ 0.4
X7-01	PIN1			x	Protective earth (PE)	
	PIN2			x	Neutral conductor (N)	
	PIN3				Fuel valve V2 (oil)	AC 230 V +10 % / -15 %, 50...60 Hz, 1 A, cosφ 0.4
X7-02	PIN1			x	Protective earth (PE)	
	PIN2			x	Neutral conductor (N)	
	PIN3			x	Fuel valve V3 (oil)	AC 230 V +10 % / -15 %, 50...60 Hz, 1 A, cosφ 0.4
X7-03	PIN1			x	Protective earth (PE)	
	PIN2		x		Start release signal gas CPL (LMV52...)	AC 230 V +10 % / -15 %, 50...60 Hz, Imax 1.5 mA
	PIN3			x	Power signal (reserve)	AC 230 V +10 % / -15 %, 50...60 Hz, Imax 500 mA
X8-01			PIN2		x	Firing on oil	AC 230 V +10 % / -15 %, 50...60 Hz, 1 A, cosφ 0.4
			PIN1		x	Firing on gas	AC 230 V +10 % / -15 %, 50...60 Hz, 1 A, cosφ 0.4
X8-02			PIN4		x	Protective earth (PE)	
			PIN3		x	Neutral conductor (N)	
			PIN2		x	Wiring point for valves connected in series	
			PIN1		x	Fuel valve V1 (oil)	AC 230 V +10 % / -15 %, 50...60 Hz, 1 A, cosφ 0.4
X8-03			PIN4		x	Protective earth (PE)	
			PIN3		x	Neutral conductor (N)	
			PIN2		x	Wiring point for valves connected in series	
			PIN1		x	Fuel valve V1 (oil)	AC 230 V +10 % / -15 %, 50...60 Hz, 1 A, cosφ 0.4

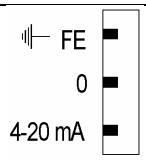
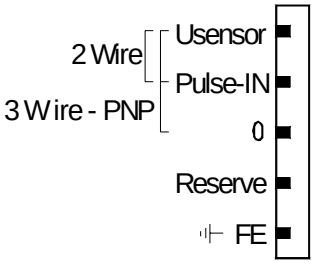
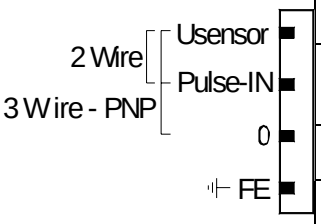
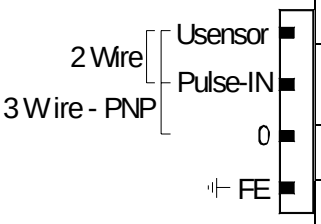
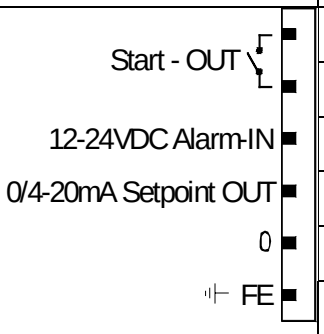
Description of the connection terminals (cont'd)

Terminal marking	Connection symbol		Input	Output	Description	Electrical rating
X9-01		PIN4		x	Fuel valve V1 (gas)	AC 230 V +10 % / -15 %, 50...60 Hz, 2 A, cosφ 0.4
		PIN3		x	Fuel valve V2 (gas)	AC 230 V +10 % / -15 %, 50...60 Hz, 2 A, cosφ 0.4
		PIN2		x	Fuel valve PV (gas)	AC 230 V +10 % / -15 %, 50...60 Hz, 2 A, cosφ 0.4
		PIN1		x	Fuel valve SV (gas)	AC 230 V +10 % / -15 %, 50...60 Hz, 2 A, cosφ 0.4
X9-02		PIN2		x	Protective earth (PE)	
		PIN1		x	Neutral conductor (N)	
X9-03		PIN4	x		Pressure switch-min-gas, start release gas	AC 230 V +10 % / -15 %, 50...60 Hz, Imax 1.5 mA
		PIN3	x		Pressure switch-max-gas (DWmax-gas)	AC 230 V +10 % / -15 %, 50...60 Hz, Imax 1.5 mA
		PIN2	x		Pressure switch-VP-gas / LT or valve closing contact (CPI)	AC 230 V +10 % / -15 %, 50...60 Hz, Imax 1.5 mA
		PIN1		x	Power signal for pressure switch	AC 230 V +10 % / -15 %, 50...60 Hz, Imax 500 mA
X10-01		PIN4		x	Neutral conductor (N)	AC 230 V +10 % / -15 %, 50...60 Hz, max 1 mA
		PIN3		x	Power signal transformer	
		PIN2	x		AC power signal GO	AC 12 V +10 % / -15 %, 50...60 Hz, max 1.2 mA
		PIN1	x		AC power signal G	
X10-02		PIN6	x		QRI... (IR detector) signal voltage	Umax DC 5 V
		PIN5		x	Protective earth (PE)	
		PIN4		x	Neutral conductor (N)	
		PIN3		x	Power signal	AC 230 V +10 % / -15 %, 50...60 Hz, Imax 500 mA
		PIN2		x	QRI... (IR detector) power supply	DC 14 / 21 VC Imax 100 mA
		PIN1	x		QRB... signal voltage	max. DC 8 V
X10-03		PIN1		x	Ionization probe	Umax (X3-04-PINS) Imax. 0.5 mA

Description of the connection terminals (cont'd)

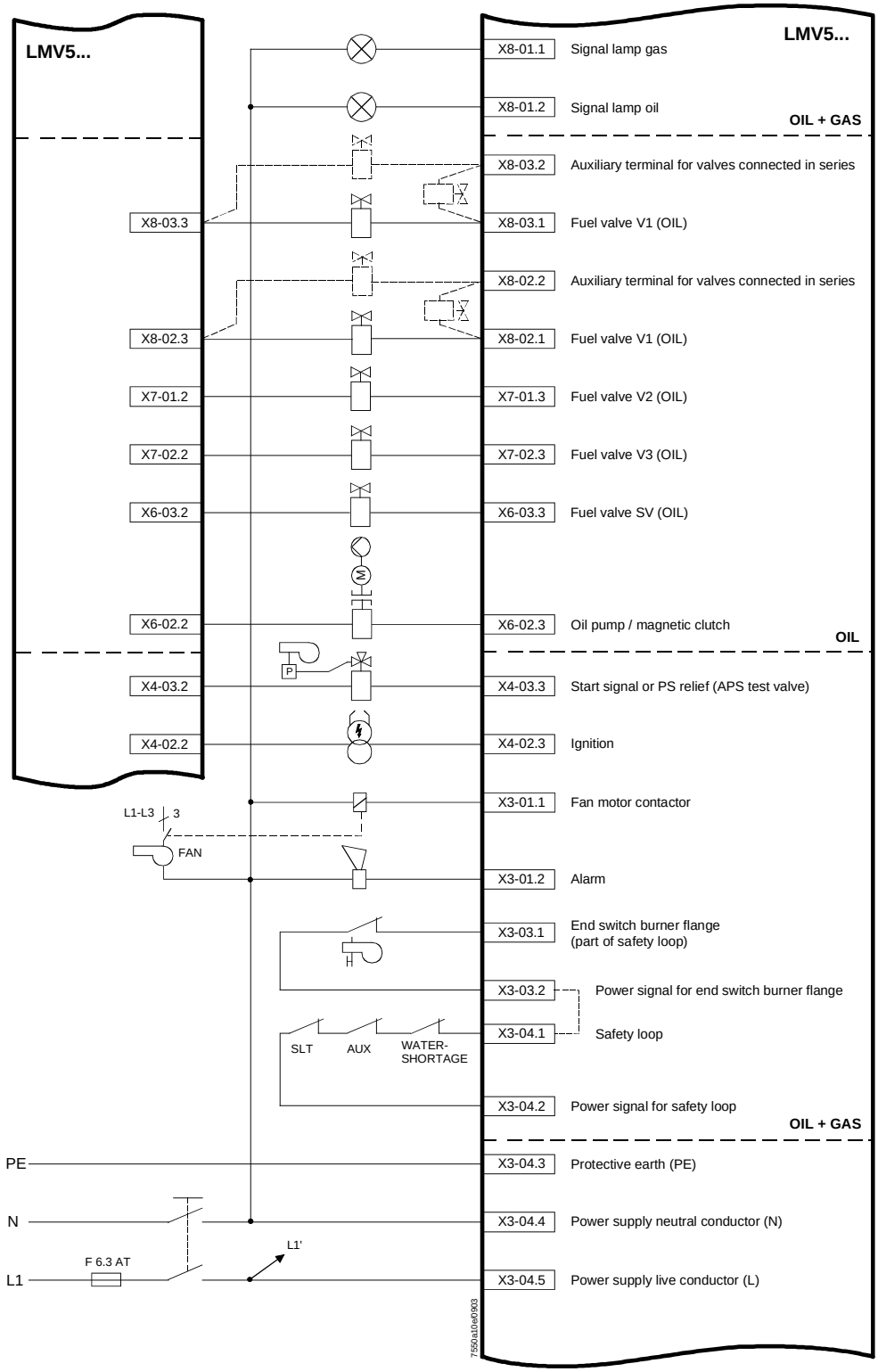
Terminal marking	Connection symbol		Input	Output	Description	Electrical rating
X50		PIN6		x	Reference ground (PELV)	
		PIN5		x	Communication signal	DC U ← 5 V, Rw = 120 Ω, level to ISO-DIS 11898
		PIN4		x	Communication signal	
		PIN3		x	AC power supply for actuators / display and operating unit AZL...	AC 12 V +10 % / -15 %, 50...60 Hz, fuse max. 4 A
		PIN2		x		
		PIN1		x	Shield connection (functional earth)	
X51		PIN6		x	Reference ground (PELV)	
		PIN5		x	Communication signal	DC U ← 5 V, Rw = 120 Ω, level to ISO-DIS 11898
		PIN4		x	Communication signal	
		PIN3		x	AC power supply for actuators / display and operating unit AZL...	AC 12 V +10 % / -15 %, 50...60 Hz, fuse max. 4 A
		PIN2		x		
		PIN1		x	Shield connection (functional earth)	
X52		PIN4	x		Functional earth	
		PIN3	x		AC power supply from transformer to LMV5... system	AC 12 V +10 % / -15 %, 50...60 Hz
		PIN2	x		Reference ground (PELV)	
		PIN1	x		AC power supply from transformer to LMV5... system	AC 12 V +10 % / -15 %, 50...60 Hz
Temperature / pressure controller						
X60		PIN5	x		Functional earth for shielding connection	
		PIN4	x		Reference ground	
		PIN3	x		Temperature sensor input Pt / LG-Ni 1000 (Input 4, TEMP.)	
		PIN2	x		Line compensation temperature sensor Pt100	
		PIN1	x		Temperature sensor input Pt100 (input 1, TEMP.)	
X61		PIN5	x		Functional earth for shielding connection	
		PIN4	x		Reference ground	
		PIN3	x		Current input for temperature / pressure signal (input 2, TEMP / PRESS INPUT 4...20 mA	DC 0...20 mA
		PIN2	x		Voltage input for temperature / pressure signal (input 2, TEMP / PRESS INPUT DC 0...10 V)	DC 0...10 V
		PIN1		x	Power supply for temperature / pressure transmitter	approx. DC 20 V max. 25 mA
X62		PIN5	x		Functional earth for shielding connection	
		PIN4	x		Reference ground	
		PIN3	x		Current input for setpoint or load (input 3, SETPOINT INPUT)	DC 0...20 mA
		PIN2	x		Voltage input for setpoint or load (input 3, SETPOINT INPUT)	DC 0...10 V
		PIN1		x	Power supply for setpoint changeover	approx. DC 24 V max. 2 mA

Description of the connection terminals (cont'd)

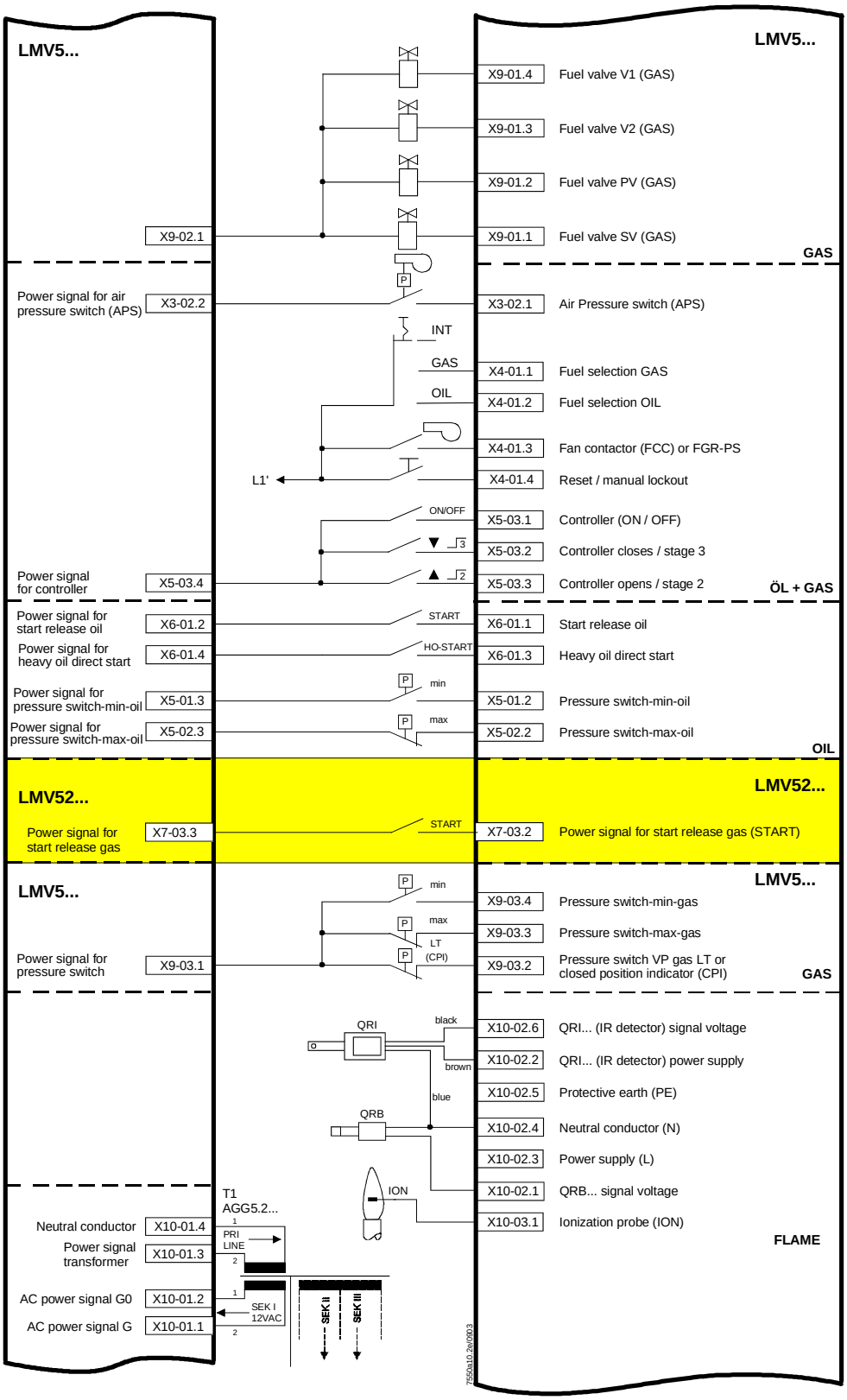
Terminal marking	Connection symbol		Input	Output	Description	Electrical rating
Temperature / pressure controller						
X63		PIN3	x		Functional earth for shielding connection	
		PIN2		x	Reference ground	
		PIN3		x	Current output for burner load (LOAD OUTPUT)	DC 4...20 mA, RLmax = 500 Ω
Variable speed drive module						
X70		PIN1		x	Power supply for speed sensor	approx. 10 V max. 45 mA
		PIN2	x		Speed input	Uin max = DC 10 V Uin min high level = DC 3 V Uin max low level = DC 1.5 V
		PIN3		x	Reference ground	
		PIN4			Reserve	
		PIN5	x		Functional earth for shielding connection	
X71		PIN1		x	Power supply for fuel meter	approx. 10 V max. 45 mA
		PIN2	x		Fuel meter input gas	Uin max = DC 10 V Uin min high level = DC 3 V Uin max low level = DC 1.5 V
		PIN3		x	Reference ground	
		PIN4	x		Functional earth for shielding connection	
X72		PIN1		x	Power supply for fuel meter	approx. 10 V max. 45 mA
		PIN2	x		Fuel meter input oil	Uin max = DC 10 V Uin min high level = DC 3 V Uin max low level = DC 1.5 V
		PIN3		x	Reference ground	
		PIN4	x		Functional earth for shielding connection	
X73		PIN1		x	Reference contact	max. AC / DC 24 V max. 2 A
		PIN2		x	Release contact	
		PIN3	x		Alarm input	DC 0... 24 V
		PIN4		x	0 / 4...20 mA control of variable speed drive	0...20 mA RLmax = 750 Ω
		PIN5		x	Reference ground	
		PIN6	x		Functional earth	

3. Block diagram with inputs and outputs

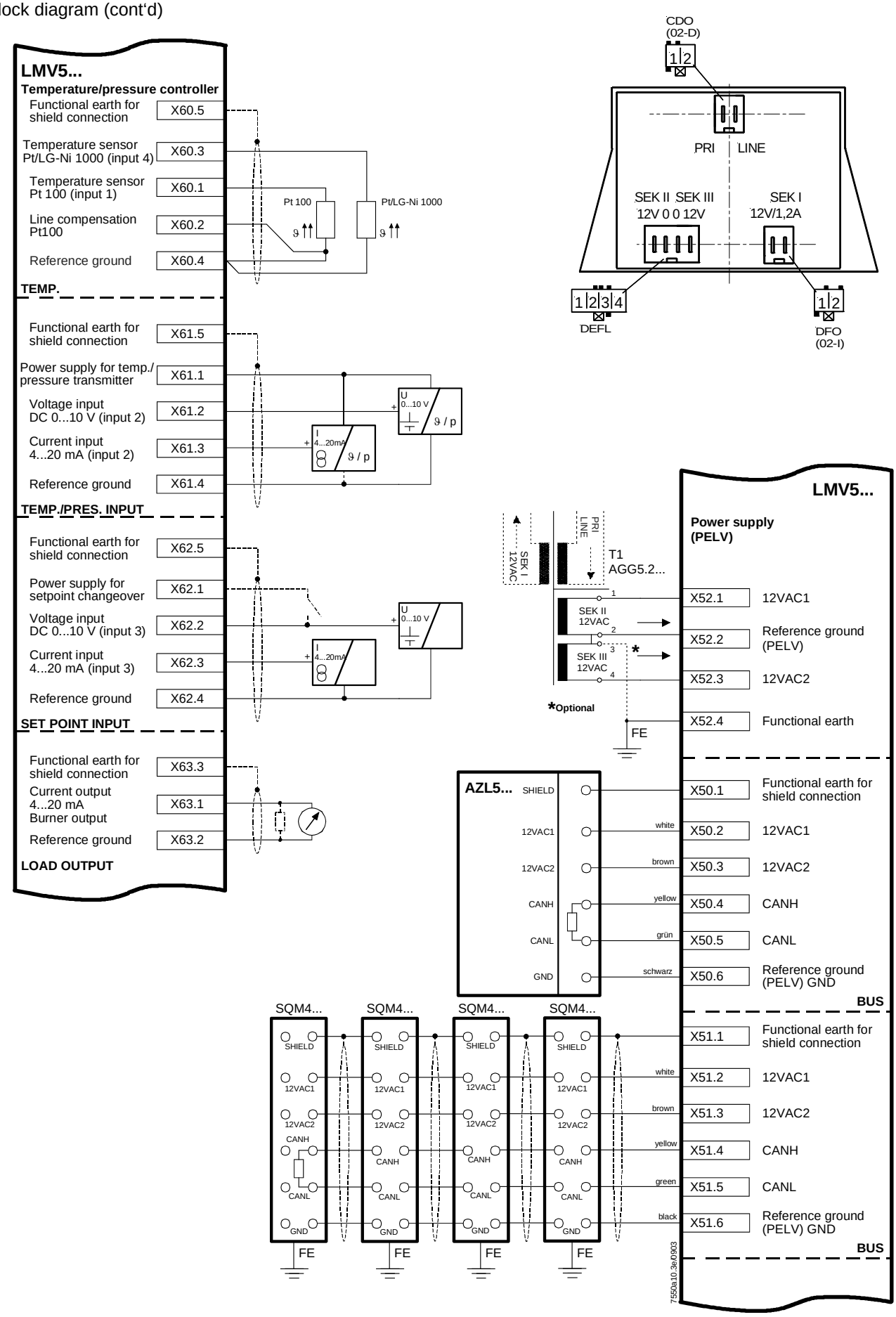
Block diagram



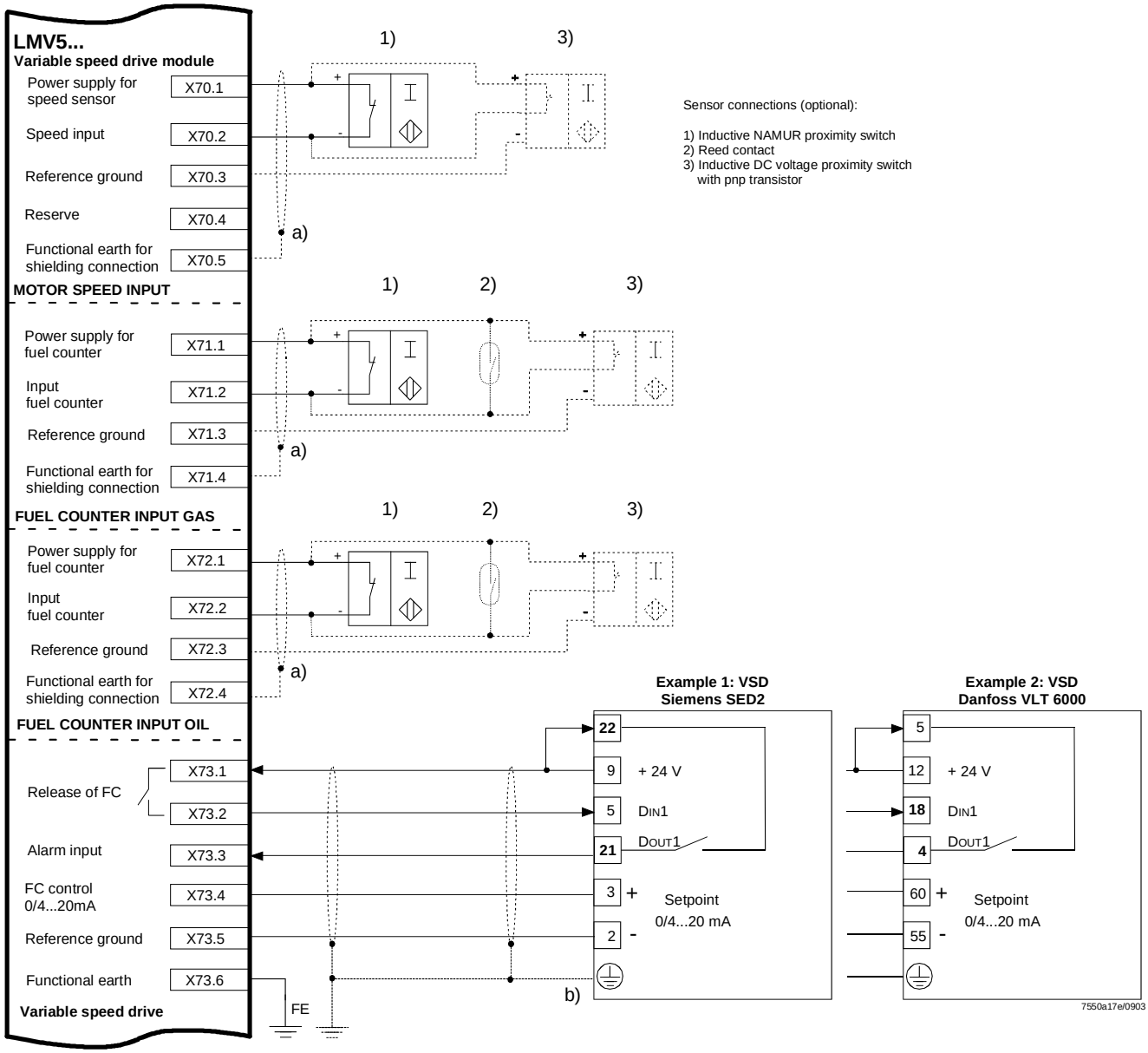
Block diagram (cont'd)



Block diagram (cont'd)



Block diagram (cont'd)



Shielding

a) + b) Optional shielding connection for rough environmental conditions.

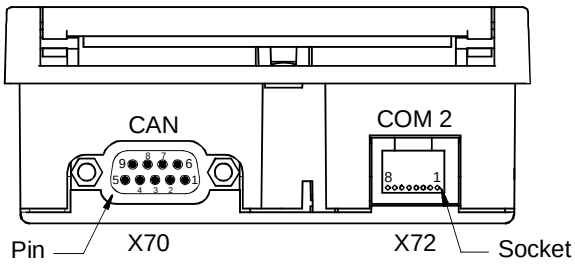
b) For shielding of cable at the variable speed drive, refer to the following pieces of documentation:

- Siemens Commissioning Guide SED2 Variable Speed Drives, (CM1G5192en) chapters 4 and 7, or
- Danfoss Operating instructions VLT 6000 (MG60A702), chapter «Installation»

4. Assignment of AZL terminals

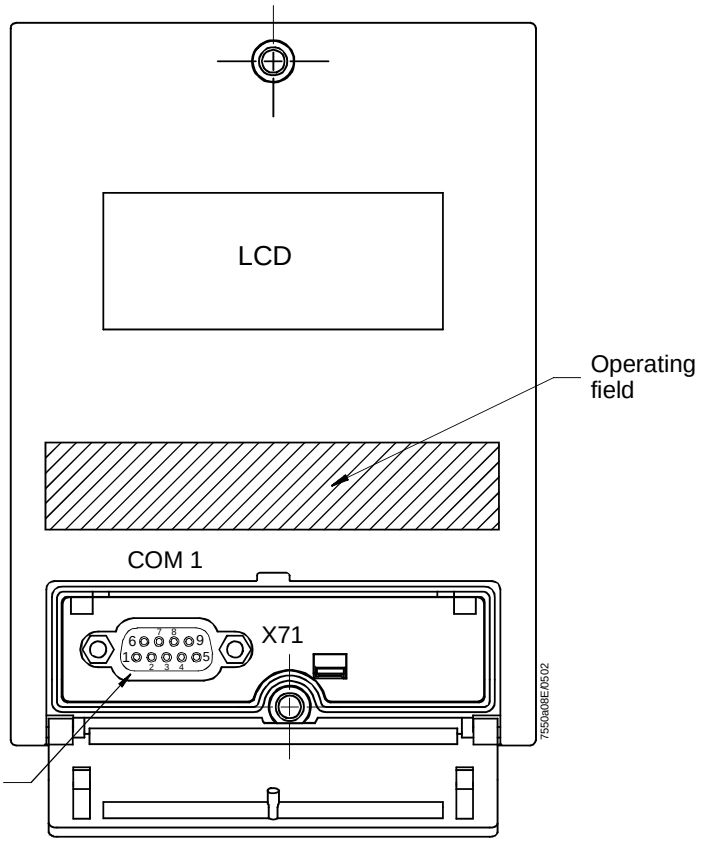
CAN X70

PIN
2 CAN L
3 GND
4 VAC 2
7 CAN H
8 VAC 1



COM2 X72

PIN
1 TXD
3 RXD
4, 6 GND
5 U 1
7 U 2



COM1 X71

PIN
2 RXD
3 TXD
5 GND

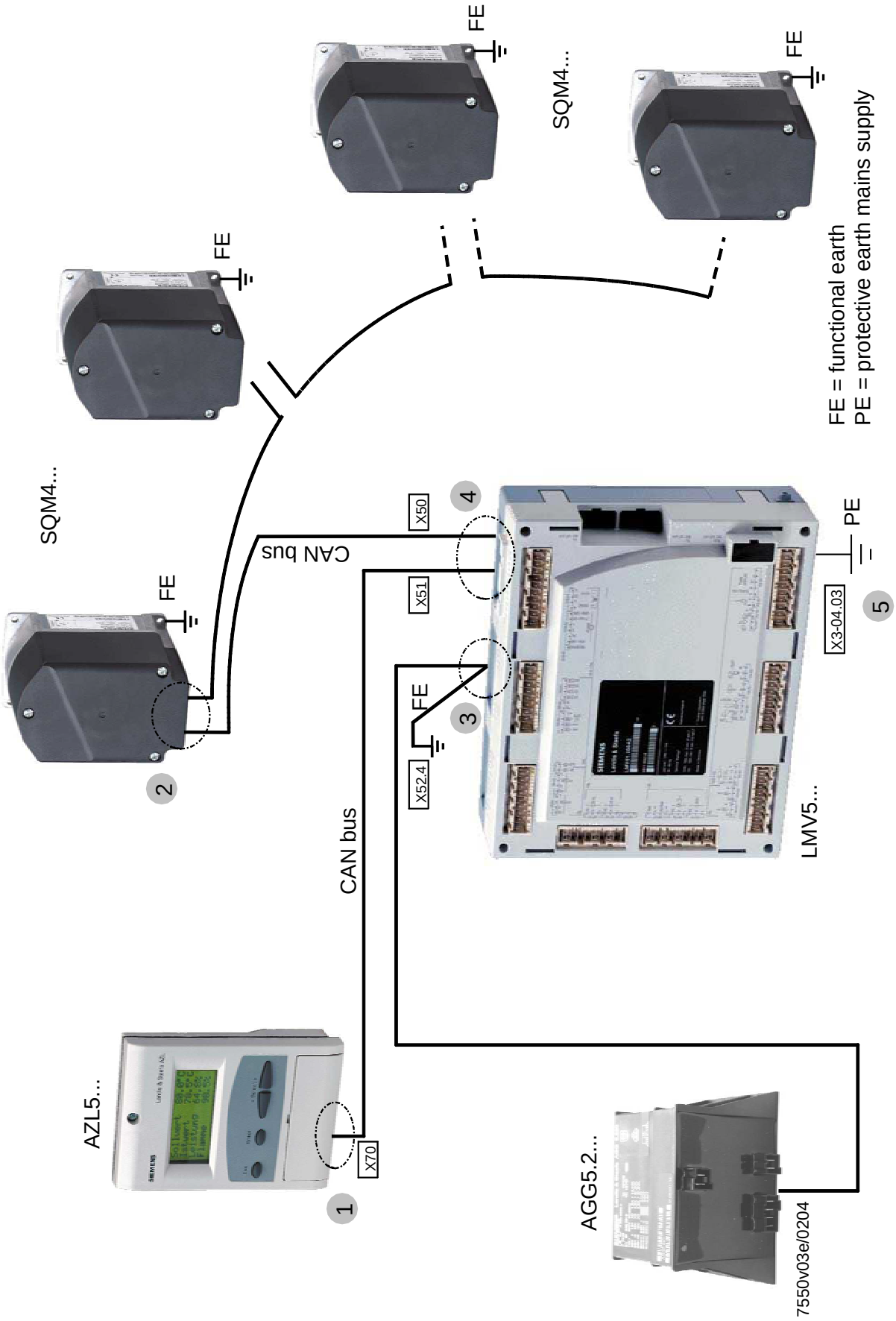
Unknown pins = not connected

COM1	Port for PC (RS-232); for parameterization and visualization with the help of the PC tool software
COM2	Port for BMS via external e-bus interface
CAN	Port for the LMV5… basic unit

Note

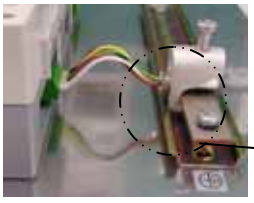
COM1 and COM2 **cannot** be active at the same time!

5. Earthing and wiring the LMV5... system



Wiring in compliance with EMC regulations

- Use shielded cables for the bus connections between LMV5..., SQM4... and AZL5... in control panels also
- Every actuator used with the LMV5... must be connected to the same functional earth (FE) or the same earthing point, using a short cable or a low-resistance housing connection like the LMV5...
- Make certain that there is proper electrical contact between the housing of the SQM4... and functional earth (use lock washers and galvanically conductive mounting plates)
- Run mains and bus cables separately in separate cable ducts while observing the greatest possible distance
- Run cables from and to ignition equipment separately while observing the greatest possible distance to bus cables
- Use the shortest distance for the high-voltage cable from the ignition equipment to the ignition electrodes
- When using bipolar ignition equipment, the cables should be run close together to ensure the area of emissions is as small as possible

1		Plug AGG5.635 (3 m CAN bus cable with shielded connector) into X70 of the AZL5...
2	   	Connect housing of SQM4... actuators to functional earth (FE): Combine inner shielding of data line with outer shielding of cable in a ferrule if possible and use clamp and cable to make the connection to functional earth on the actuator. <u>Ferrules without synthetic material collars:</u> For cable **AGG5.640** Osterrath Type H25/15 Part no. 012440 For cable **AGG5.630** Osterrath Type H35/18 Part no. 036890
3		Connect functional earth (X52.4) to earthing point (FE) using a short cable.
4	 Alternatively  	Connect shielding connector AGG5.110 to X50, X51. Combine inner shielding of data line with outer shielding of cable if possible and connect with the help of the AGG5.110. Fit ferrule, see picture 2 In the control panel, connect shielding connector (e.g. Wago) to X50, X51 (keep piece of unshielded cable as short as possible).
5		Connect protective earth (PE) to X3-04.03.

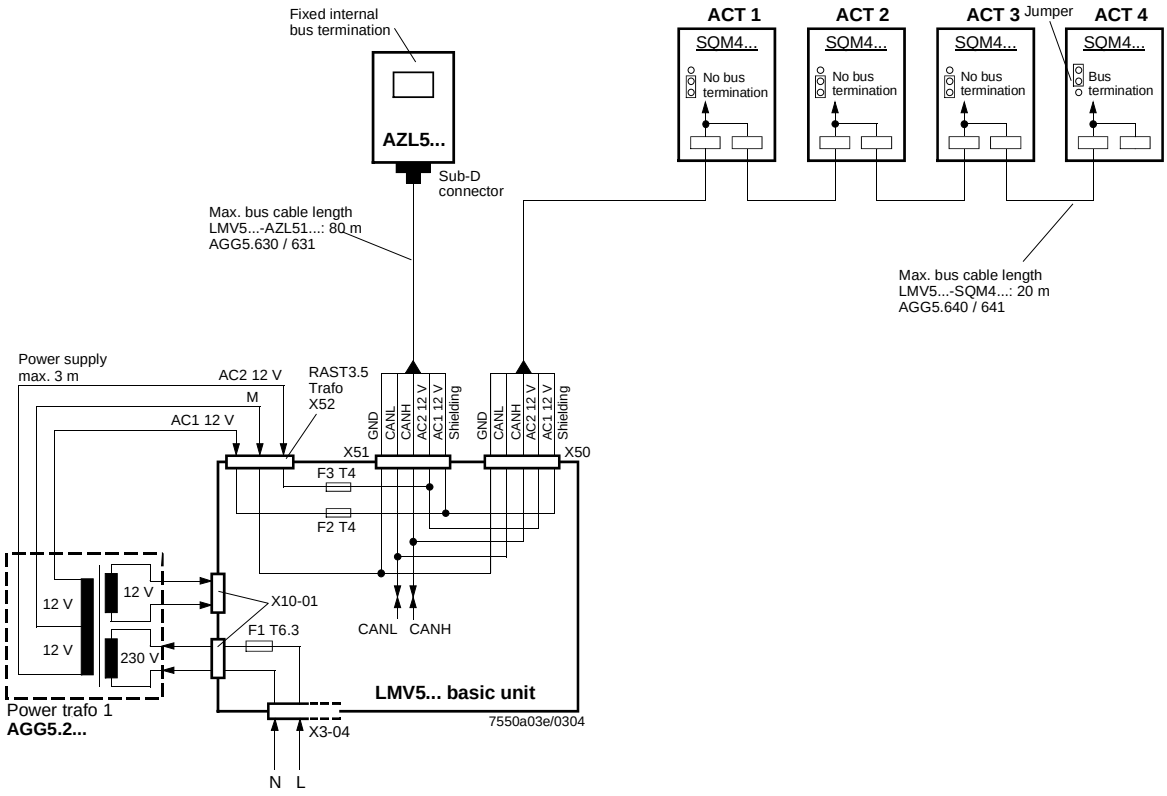
6. Power supply to the LMV5... system

General

The LMV5... system is powered via external transformer AGG5.2.... This transformer supplies power to certain electronics sections via terminal X10 – 01, and to internal modules, actuators and display and operating units via terminal X52.
The power lines to the bus users are run together with the communication lines in a common cable.
Since the transformer's power line is restricted, a second power transformer is required if the system uses more than one SQM48 actuator (or in the case of longer distances).
In principle, the bus topology always has a line structure and, therefore, has a start and an end node.
The individual bus users are connected in series, whereby the respective end nodes are terminated by bus terminating resistors.
The basic unit is a component of the communication line and is looped in between the AZL and the actuators.
In the system, the AZL always assumes the function of a bus end node. The required bus terminating resistor is already integrated in that case.
With the actuators, the last user becomes the bus end node (here, the internal bus termination must be activated via a connecting plug).
The other node users within the line structure are configured without terminating resistor.

Example 1

Installation of all components in the burner;
CAN bus cable «LMV5... → SA» 20 m

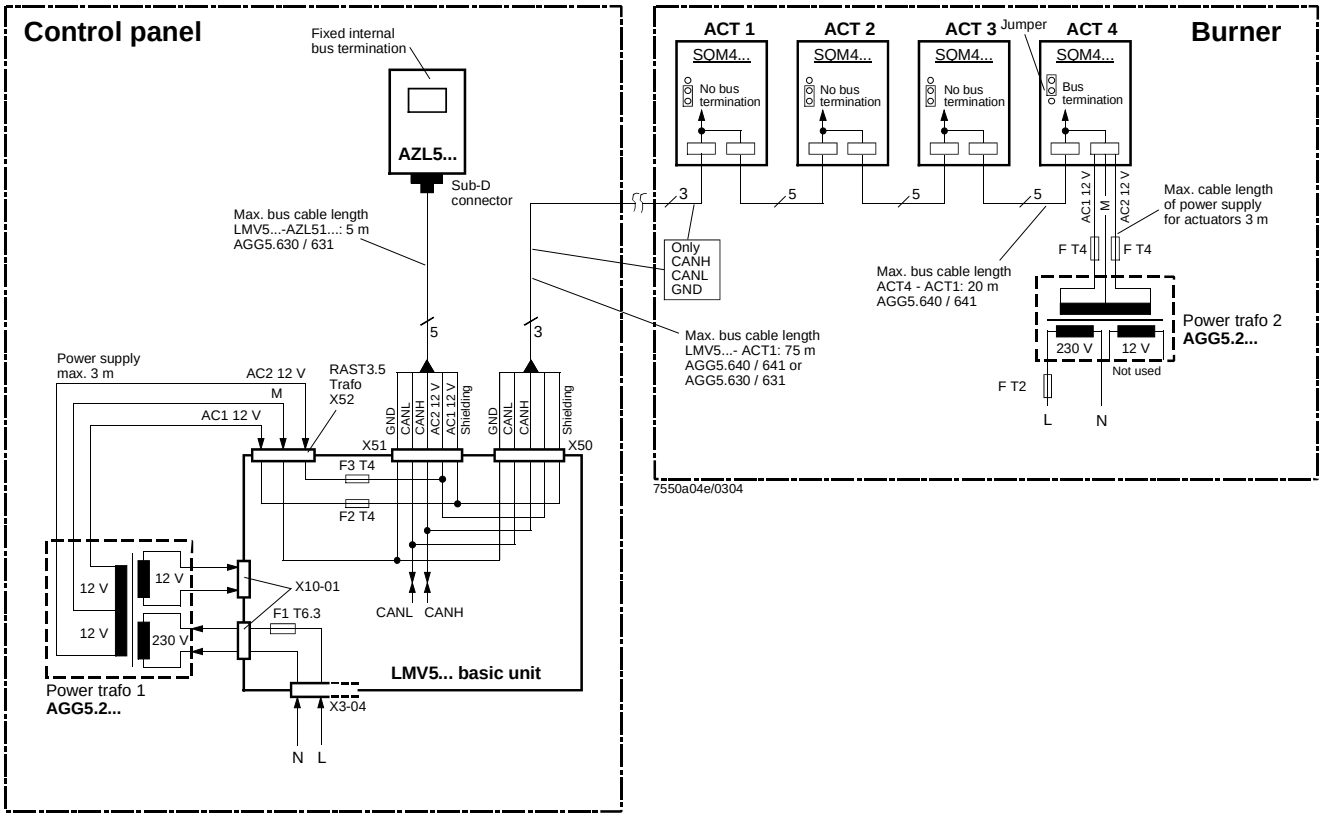


Note on example 1

Total length of CAN bus cable ≤ 100 m

Example 2

LMV5... basic unit in the control panel, actuator on the burner;
CAN bus cable «LMV5... → SA» > 20 m



Notes on example 2

Total length of CAN bus cable ≤ 100 m

Whenever the distance between the LMV5... and the last actuator exceeds 20 m, or if more than one SQM48 is used on the burner (refer to sizing chart, “Determination of the maximum cable length“), a second transformer is required for powering the actuators.

In that case, transformer 1 powers the LMV5... basic unit and the AZL5... display and operator unit (**Fig. 1**). Transformer 2 powers the actuators (**Fig. 2**).

With the CAN bus cable connections from the LMV5... (**Fig. 1**) to the first actuator (**Fig. 2**), the 2 voltages AC1 and AC2 on the LMV5... side will **not be** connected and only the cables CANH, CANL and M (+shielding) will be connected to the first actuator (**Fig. 2**).

In that case, the actuators are powered by a second transformer which must be located near the actuators.

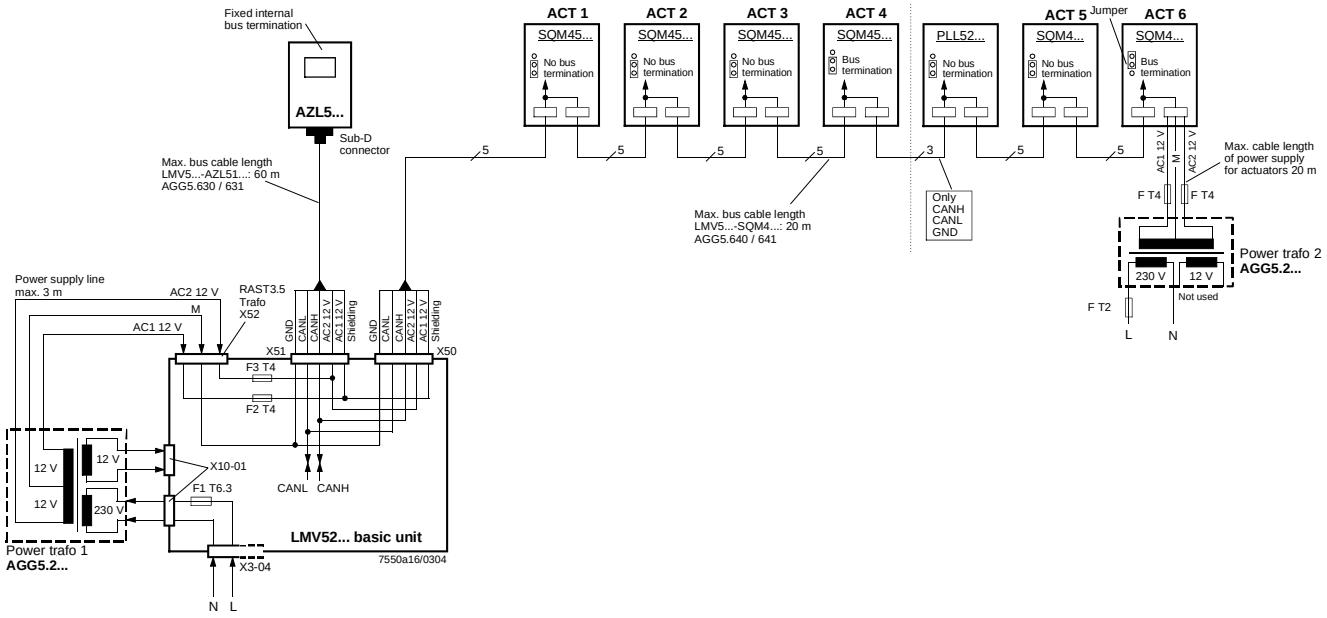
The power from that transformer (cables AC1, AC2, M) is fed to the actuator (ACT4 in the example above) and then connected through via bus cable AGG5.640 (Type1) to all the other actuators.

The fuses required for transformer 1 are accommodated in the LMV5... basic unit.

For transformer 2, these 3 fuses must be located close to the transformer (for type, refer to Basic Documentation P7550).

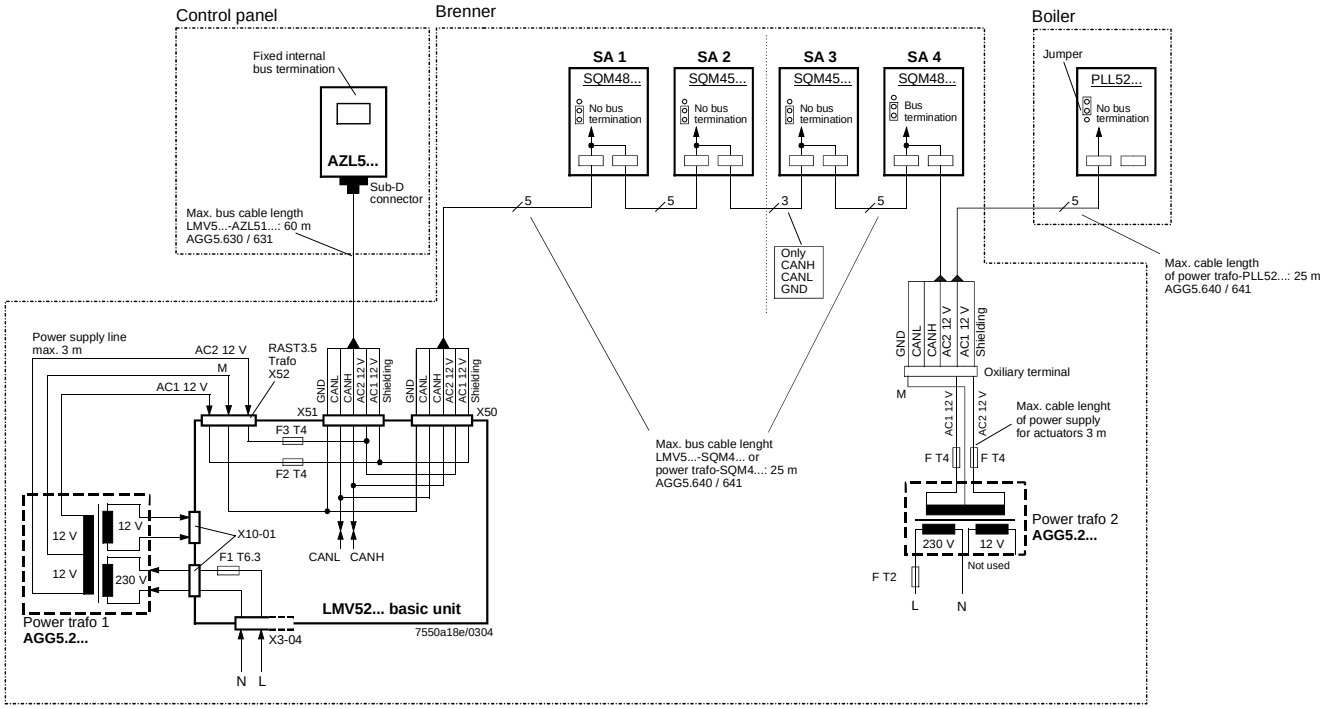
Example 3a

Installation of all components in the burner;
CAN bus cable «LMV52... ↔ SA» > 20 m with 6 actuators and O2 module PLL52...



Example 3b

Installation in the control panel, actuator on the burner;
CAN bus cable «LMV52... ↔ SA» > 25 m with 4 actuators and O2 module PLL52...



Notes on example 3a / 3b

CAN bus cable with LMV52... and more than 4 actuators and O2 module PLL52...

On LMV52... applications using more than 4 actuators (SQM45...), a second transformer is required for powering the extra actuators.

In that case, transformer 1 powers the LMV52... basic unit, the **AZL5...**, and the first 4 actuators.

With the CAN bus cable connection from the fourth actuator to the O2 module, the 2 voltages AC1 and AC2 will **not** be connected on the «actuator 4» side, but only lines «CANH, CANL and M» (+shielding) will be connected to the O2 module.

In that case, the actuators and the O2 module are to be powered by a second transformer which must physically be located near the actuators and the O2 module.

The supply line from that transformer will be connected to the actuator («SA6» in the example 3a or «Oxiliary terminal» in the example 3b above) (lines AC1, AC2, and M), to be run from there via the bus cable to all the other actuators and the O2 module.

The fuses required for transformer 1 are accommodated in the LMV52... basic unit.

For transformer 2, the OEM must fit the 3 fuses in the vicinity of the transformer.

Determination of the maximum cable length

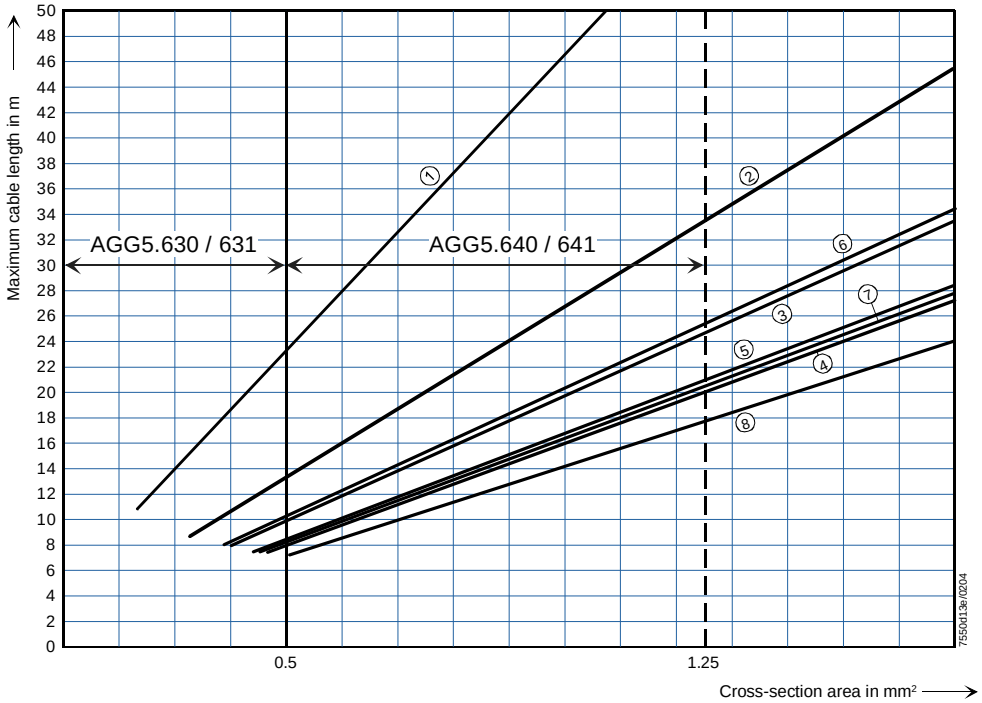
The maximum cable length between transformer and bus users is dependent on the type of cable (cross-sectional area), the number of actuators and the type of actuator used (current).

The following graphs can be used to determine the maximum bus cable lengths between the transformer and group of actuators or the AZL, depending on the relevant influencing factors.

The assumption was made that the actuators within the group are close to one another.

The **minimum** cross-sectional area for the system examples shown results from the start of the curve.

The **maximum** cable lengths for the defined system cables AGG5.640 and AGG5.630 result from the points of intersection in the graph.



AGG5.630 / 631 (cable type 2)
AGG5.640 / 641 (cable type 1)

① 1 x SQM45
② 2 x SQM45
③ 3 x SQM45
④ 4 x SQM45
⑤ 2 x SQM48
⑥ 1 x SQM45 + 1 x SQM48
⑦ 2 x SQM45 + 1 x SQM48
⑧ 3 x SQM45 + 1 x SQM48

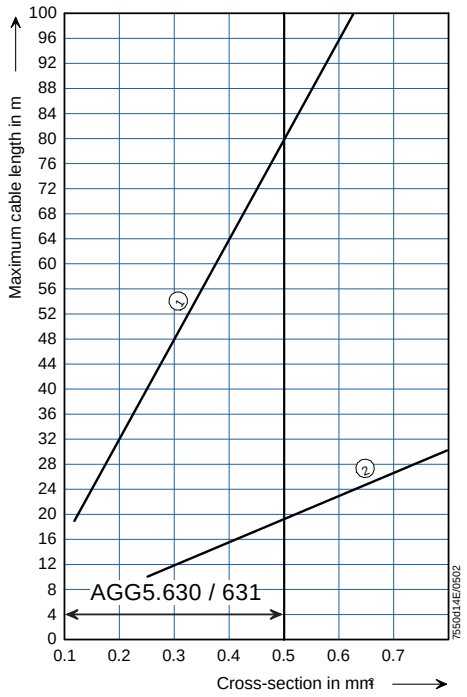
Bus connection between transformer and actuator group

If, in addition a PLL52... is connected to the mains network, the maximum permissible cable lengths to the network will have to be redused by 2 m.

Example 1

System cable AGG5.640 (connecting cable to the actuators)
Actuators, 2 x SQM45...
The point of intersection of the vertical line for the AGG5.640 (1.25 mm^2) and curve ② (2 x SQM45...) gives a maximum cable length of 33.4 m between the transformer and the group of actuators.
The minimum cross-sectional area is 0.33 mm^2.

Example 2



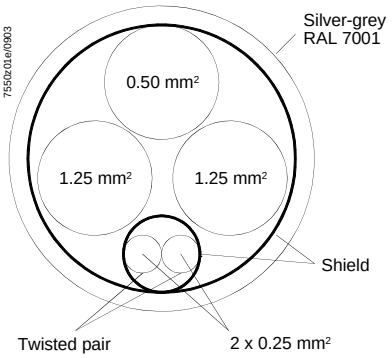
AGG5.630 / 631 (cable type 2)
① 1 x AZL
② 1 x AZL + 1 x SQM45

Bus connection with system AGG5.630/631 to AZL5....

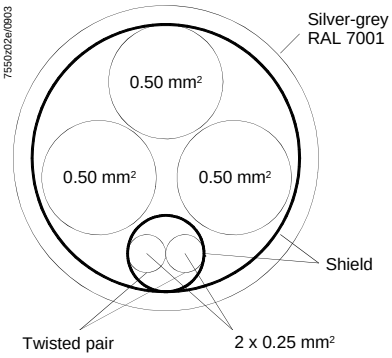
Point of intersection of vertical line AGG5.630 (0.5 mm^2) with curve ① produces a maximum cable length of 80 m between power transformer and AZL5....

Types of cable

AGG5.640 / 641 (cable type 1) LMV5... ↔ SA



AGG5.630 / 631 (cable type 2) LMV5... ↔ AZL5...



7. Connection of accessories

Connecting cable to the e-bus adapter

AZL COM2 8-pin Western		Cable	e-bus PC adapter 25-pin SUB-D connector	
1	TxD			2
2	—		—	
3	RxD			3
4	GND			7
5	U1			20
6	GND		—	
7	U2			4
8	—		—	

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Connecting cable to the PC

AZL COM1 9-pin connector		Cable	PC COM 9-pin socket	
1				1
2	RxD		RxD	2
3	TxD		TxD	3
4				4
5	GND		GND	5
6				6
7				7
8				8
9				9

7550t01E/0502

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