

Product range overview

LMV5...

The LMV5... burner management system provides all supervisory functions required for forced draft oil or gas burners of medium to high capacity and facilitates modular system extensions via integrated communication interfaces.

Integrated in the LMV5... basic unit are:

- Burner control, including gas valve proving
- Electronic fuel-air ratio control for a maximum of 6 actuators
- Optional PID temperature / pressure controller (load controller)
- Optional VSD module
- Optional O₂ control and an O₂ monitor (with PLL52 and QGO2)

This documentation is a brief overview of the most important functions and components of the product family of the LMV5 burner management systems.

Use

- Residential and nonresidential buildings that use hot water or steam boilers
- Industrial plants
- Direct-fired heat production plant

Target groups

- Sales engineers
- In-house personnel
- Burner manufacturers (OEMs)
- Installers
- Planning engineers
- Plant operators

Based on the following software versions:

LMV50...:	V10.20
LMV51...:	V05.10
LMV51.3...:	V05.10
LMV52.2...:	V05.10
LMV52.4...:	V10.20
Int. LR module:	V02.10
Int. VSD module:	V01.50
AZL52...:	V05.00
PLL52...:	V01.50

Functions

	LMV51.0...	LMV51.1...	LMV51.3...	LMV50...	LMV52.2...	LMV52.4...
Electronic fuel / air ratio control						
Fuel oil	●	●	●	●	●	●
Fuel gas	●	●	●	●	●	●
Actuator for: Air damper, fuel damper, actuator 1	●	●	●	●	●	●
Actuator for: Air damper, fuel damper, actuator 3 and VSD			●	●	●	●
Actuator for: Air damper, fuel damper, actuator 1, VSD, actuator 3 or VSD + actuator 3			●	●		
Actuator for: Air damper, fuel damper, actuator 1...3 and VSD					●	●
Up to 15 curvepoints per actuator	●	●	●	●	●	●
Linear interpolation between curvepoints	●	●	●	●	●	●
Supervision of actuator positions	●	●	●	●	●	●
Detection of line interruptions of actuators	●	●	●	●	●	●
Pneumatic fuel-air ratio control						
Using an air actuator and a suitable gas control valve, all types of gas-fired fuel trains (modulating operation) can also be operated as pneumatic fuel-air ratio control systems	●	●	●	●	●	●
Fuel trains						
Gas - direct ignition, modulating operation (G)	●	●	●	●	●	●
Gas - with pilot ignition, one pilot valve, modulating operation (Gp1)	●	●	●	●	●	●
Gas - with pilot ignition, 2 pilot valves, modulating operation (Gp2)	●	●	●	●	●	●
Light oil - direct ignition, modulating operation (LO)	●	●	●	●	●	●
Light oil - direct ignition, 1-stage operation (LO)	●	●	●	●	●	●
Light oil - direct ignition, 2-stage operation (LO)	●	●	●	●	●	●
Light oil - direct ignition, 3-stage operation (LO)	●	●	●	●	●	●
Heavy oil - direct ignition, modulating operation (HO)	●	●	●	●	●	●
Heavy oil - direct ignition, 1-stage operation (HO)	●	●	●	●	●	●
Heavy oil - direct ignition, 2-stage operation (HO)	●	●	●	●	●	●
Dual-fuel burner: Any type of gas-fired fuel train (G), (Gp1) or (Gp2) can be arbitrarily combined with an oil-fired fuel train (LO) or (HO)	●	●	●	●	●	●
Dual-fuel burner: Oil-fired fuel trains (LOGp) and (HOGp) are only suited for ignition with a gas pilot and may only be used for a dual-fuel burner when combined with the gas-fired fuel train (Gp2)	●	●	●	●	●	●
Continuous-operation pilot for all pilot fuel trains (Gp1, Gp2, LOGp, HOGp). The pilot valve continues to be controlled in operation together with the main valve.				●	●	●
Skipping of phases 50 and 52 in the case of direct ignition fuel trains (G, LO, HO)	●	●	●	●	●	●
Flame detectors for intermittent operation						
UV flame detector QRA2..., QRA10... with AGQ1... (only for 230 V versions available)	●	●	●	●	●	●
Photoresistive detector QRB...	●	●	●	●	●	●

Functions (cont'd)

	LMV51.0...	LMV51.1...	LMV51.3...	LMV50...	LMV52.2...	LMV52.4...
Flame detectors for continuous operation						
Ionization probe	●	●	●	●	●	●
Infrared flame detector QRI...	●	●	●	●	●	●
UV flame detector QRA7...	●	●	●	●	●	●
Separate flame supervision of pilot and main flames						
Input A: For QRI..., QRA7... or QRB...				●	●	●
Input B: For ionization probe						
Flame supervision via external, safety-oriented flame monitor						
Connection of an external flame safeguard at input X6-01 pin 3 and X6-01 pin 1				●	●	●
Gas valve proving in connection with a gas pressure switch						
Selectable: Before, after or before, and after startup (can be deactivated)	●	●	●	●	●	●
Gas valve proving function with gas pressure switch and supervision of valve closure contact for oil and gas valves						
Input for valve closure contact (X7-03 pin 2)	●	●	●	●	●	●
Digital Inputs / signal loops						
Safety loop	●	●	●	●	●	●
Burner flange (component of safety loop)	●	●	●	●	●	●
Air pressure switch (can be deactivated)	●	●	●	●	●	●
Gas pressure switch valve proving or gas and/or oil valve closing contacts (CPI or POC)	●	●	●	●	●	●
Gas pressure switch-min (can be deactivated)	●	●	●	●	●	●
Gas pressure switch-max (can be deactivated)	●	●	●	●	●	●
Oil pressure switch-min (can be deactivated)	●	●	●	●	●	●
Oil pressure switch-max (can be deactivated)	●	●	●	●	●	●
Reset / manual locking	●	●	●	●	●	●
Heat request (ON/OFF)	●	●	●	●	●	●
Stage 2 or OPEN with 3-position controller	●	●	●	●	●	●
Stage 3 or CLOSE with 3-position controller (stage 3 = OPEN and CLOSE)	●	●	●	●	●	●
Fuel selection oil	●	●	●	●	●	●
Fuel selection gas	●	●	●	●	●	●
Heavy oil direct start (can be deactivated)	●	●	●	●	●	●
Start release oil (can be deactivated)	●	●	●	●	●	●
Start release gas or gas and/or oil valve closing contacts (CPI or POC)			●	●	●	●
Fan contactor contact or pressure switch flue gas recirculation (can be deactivated)	●	●	●	●	●	●
Startup stop	●	●	●	●	●	●
Start/Stop in phase 36 for non safety-relevant multi-burner applications	●	●	●	●	●	●

Functions (cont'd)

	LMV51.0	LMV51.1	LMV51.3	LMV50...	LMV52.2	LMV52.4
Digital outputs						
Fuel valve 1 oil (V1)	●	●	●	●	●	●
Fuel valve 2 oil (V2)	●	●	●	●	●	●
Fuel valve 3 oil (V3)	●	●	●	●	●	●
Safety valve oil (SV)	●	●	●	●	●	●
Fuel valve 1 gas (V1)	●	●	●	●	●	●
Fuel valve 2 gas (V2)	●	●	●	●	●	●
Fuel valve 3 gas (V3)	●	●	●	●	●	●
Safety valve gas (SV)	●	●	●	●	●	●
Start signal or pressure switch relieve valve	●	●	●	●	●	●
Ignition	●	●	●	●	●	●
Fan or continuous fan operation	●	●	●	●	●	●
Alarm	●	●	●	●	●	●
Indication of oil firing	●	●	●	●	●	●
Indication of gas firing	●	●	●	●	●	●
Oil pump or magnetic clutch	●	●	●	●	●	●
Inputs for connection of external load controllers						
Heat request (ON/OFF), see also <i>Digital inputs</i>	●	●	●	●	●	●
Stage 2 or OPEN with 3-position controller, see also <i>Digital inputs</i>	●	●	●	●	●	●
Stage 3 or CLOSE with 3-position controller (stage 3 = OPEN and CLOSE), see also <i>Digital inputs</i>	●	●	●	●	●	●
Analog signal input for preset output		●	●	●	●	●
Preset output via Modbus (AZL5...) of BACS	●	●	●	●	●	●
Internal load controller, connections and functions						
Preset output or preset setpoint DC 0...10 V, DC 2...10 V, 0...20 mA or 4...20 mA		●	●	●	●	●
Setpoint changeover		●	●	●	●	●
Temperature or pressure switch input DC 0...10 V, DC 2...10 V, 0...20 mA or 4...20 mA		●	●	●	●	●
Temperature sensor input Pt100		●	●	●	●	●
Temperature sensor input Pt1000 or LG-Ni1000		●	●	●	●	●
Internal adaptive boiler temperature or boiler pressure control function		●	●	●	●	●
Internal temperature switch function		●	●	●	●	●
Cold start shock protection function		●	●	●	●	●
Analog outputs						
Current burner output 4...20 mA		●	●	●	●	●
Burner output, O ₂ value, temperature, pressure, flame, power or other adjustable values, 0...20 mA or 4...20 mA		●	●	●	●	●
VSD, connections and functions						
Output: VSD control 0...20 mA or 4...20 mA			●	●	●	●
Output: VSD release contact potential-free			●	●	●	●
Inputs: Feedback of fan motor's current speed, e.g. via accessory set AGG5.31...			●	●	●	●
Input: Alarm message from VSD (DC 12...24 V)			●	●	●	●
Additional air pressure switch for VSD operation is possible			●	●	●	●

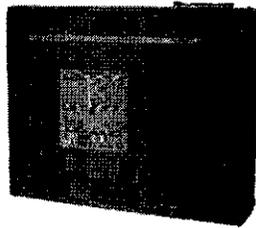
Functions (cont'd)

	LMV51.0	LMV51.1	LMV51.3	LMV50...	LMV52.2	LMV52.4
Meters and counter / statistics functions						
Fuel meter oil (input on the VSD's PBC)			●	●	●	●
Fuel meter gas (input of the VSD's PBC)			●	●	●	●
Hours run meter separately for oil and gas	●	●	●	●	●	●
Startup counter separately for oil/gas	●	●	●	●	●	●
Error message counter	●	●	●	●	●	●
Error history	●	●	●	●	●	●
Life cycle display	●	●	●	●	●	●
Residual oxygen (O2) trim control together with PLL52... and QGO20...						
O2 trim control function					●	●
Input for On/Off switching of O2 control					●	●
Specific O2 control functions for Super Low NOx burner (Mesh burner)						●
O2 limit function					●	●
Combustion air and flue gas temperature detection together with PLL52						
Warning when flue gas temperature is too high					●	●
Calculation of technical combustion efficiency factor					●	●
Flue gas feedback function						
With time or temperature threshold			●	●	●	●
Temperature-compensated						●
Other functions						
Alarm with start prevention	●	●	●	●	●	●
Gas shortage program	●	●	●	●	●	●
Program stop function	●	●	●	●	●	●
Forced intermittent operation (can be deactivated)	●	●	●	●	●	●
Partial load shutdown	●	●	●	●	●	●
Continuous fan operation	●	●	●	●	●	●
Temperature limiter		●	●	●	●	●
Cold start thermo shock protection		●	●	●	●	●
Auxiliary actuator (can be deactivated)	●	●	●	●	●	●
Actuators (can be deactivated)	●	●	●	●	●	●
Startup of low-fire position beginning in phase 50	●	●	●	●	●	●
Air pressure switch and flue gas recirculation air pressure switch parameterizable to <i>don't care</i>	●	●	●	●	●	●
Start point operation parameterizable	●	●	●	●	●	●
Long postpurge time (tn3) parameterizable				●		●

Functions (cont'd)

	LMV51.0	LMV51.1	LMV51.3	LMV50...	LMV52.2	LMV52.4
Display and operating unit AZL5...						
Parameter setting and display functions	●	●	●	●	●	●
Storage of fault and error history	●	●	●	●	●	●
Real time clock with backup (e.g. to acquire the points in time faults occur)	●	●	●	●	●	●
Contrast of display (can be set)	●	●	●	●	●	●
User language (can be selected) (several language groups available, each with a maximum of 6 languages)	●	●	●	●	●	●
Shutdown by pressing a combination of buttons	●	●	●	●	●	●
Reset	●	●	●	●	●	●
Parameter backup and restore function	●	●	●	●	●	●
Update of AZL5... software	●	●	●	●	●	●
4 access levels, 3 of them with password protection	●	●	●	●	●	●
Display of technical combustion efficiency factor (if combustion air and flue gas temperature sensors have been connected)					●	●
Communication Interface of AZL5...						
RS-232 for operation via PC and software ACS450	●	●	●	●	●	●
Modbus, eBus or data output interface for connection to building automation systems or for data output	●	●	●	●	●	●
Industry variant with specific functions						
High-temperature operation <ul style="list-style-type: none"> No flame supervision and prepurging if combustion chamber temperature >750 °C Instead of flame supervision, temperature supervision takes place via an external safety limit thermostat 				●		
Maximum times for safety time 1 and safety time 2 (TSA1/TSA2), are parameterizable to 5 seconds for gas or 10 seconds for oil				●		
Repetition parameterizable in the case of <i>no flame at end of safety time 1</i>				●		
Cooling function in standby mode				●		
<p>The cooling function is started by a mains voltage signal at input X5-03 Pin 3:</p> <ul style="list-style-type: none"> The fan is switched on and is monitored as in the case of <i>continuous purging</i> The air-setting drives are moved to their postpurge positions. 						

Burner management system



LMV5...

Service tool



ACS450

Display and operating unit

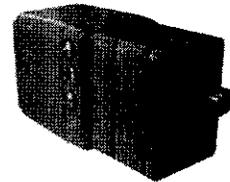


AZL52...

Actuators



SQM4...



SQM9...

Sensors and detectors

Temperature sensor



FGT-Pt1000



QAE21...

Pressure sensor



QBE2002-P...

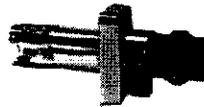
O2 sensor



QGO20...

Intermittent operation

Only for AC 230 V: Ionization alternatively with AGQ1...



QRA2...



QRA4...

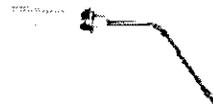


QRA10...



QRB...

Continuous operation



Ionization



QRA7...



QRI...

The products in detail

Burner management system

LMV50 (industry variants)

As LMV51, but ...

- with load controller
- with VSD operation
- with flue gas recirculation function without temperature compensation
- with industry-specific functions, such as e.g. high-temperature operation

LMV51...

Burner control with integrated fuel-air ratio control for a maximum of 4 actuators and load control for forced draft burners.

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

LMV51.0...

Same as LMV51..., but

- without load controller

LMV51.1...

Same as LMV51, but ...

- with load controller

LMV51.3...

Same as LMV51..., but

- with load controller
- with VSD operation
- with flue gas feedback function without temperature compensation

LMV52...

Burner control with integrated fuel-air ratio control for a maximum of 6 actuators and a VSD for the fan, plus load control for forced draft burners with additional O₂ trim control.

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

LMV52.2...

Same as LMV52..., but

- with load controller
- with VSD operation
- with flue gas feedback function without temperature compensation
- with O₂ trim control (with PLL52... and QGO20...)

LMV52.4...

Same as LMV52..., but

- with load controller
- with VSD operation
- with flue gas feedback function with temperature compensation
- with O₂ trim control (with PLL52... and QGO20...)
- with specific O₂ control functions for Super Low NO_x burner (Mesh burner)



The products in detail (cont'd)

Overview	Product no. (ASN)	Parameter set	Mains voltage
LMV50.3 (industry variant) - with load controller - with VSD operation - with flue gas recirculation function without temperature compensation - with industry-specific functions, such as e.g. high-temperature operation	LMV50.320B2	Industry	AC 230 V
LMV51.0... without load controller	LMV51.000C2	Europe	AC 230 V
	LMV51.040C1	US / Canada	AC 120 V
LMV51.1... with load controller	LMV51.100C1	Europe	AC 120 V
	LMV51.100C2	Europe	AC 230 V
	LMV51.140C1	US / Canada	AC 120 V
LMV51.3... - with load controller - with VSD operation - with flue gas feedback function without temperature compensation	LMV51.300B1	Europe	AC 120 V
	LMV51.300B2	Europe	AC 230 V
	LMV51.340B1	US / Canada	AC 120 V
LMV52.2... - with load controller - with VSD operation - with flue gas feedback function without temperature compensation - with O ₂ trim control (with PLL52... and QGO20...)	LMV52.200B1	Europe	AC 120 V
	LMV52.200B2	Europe	AC 230 V
	LMV52.240B1	US / Canada	AC 120 V
LMV52.4... - with load controller - with VSD operation - with flue gas feedback function with/without temperature compensation - with O ₂ trim control (with PLL52... and QGO20...) - with specific O ₂ control functions for Super Low NO _x burner (Mesh burner)	LMV52.400B2	Europe	AC 230 V
	LMV52.440B1	US / Canada	AC 120 V

The products in detail (cont'd)

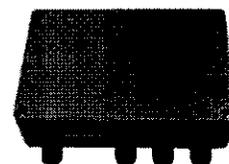
O2 module

PLL52.110A100

CAN bus module for O2 trim control with LMV52..., AC 120 V, for use with QGO20..., inputs for flue gas and combustion air temperature.

PLL52.110A200

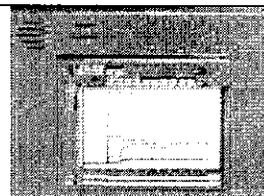
CAN bus module for O2 trim control with LMV52..., AC 230 V, for use with QGO20..., inputs for flue gas and combustion air temperature.



Service tool

ACS450

PC tool for convenient programming and burner settings, process visualization, data recording, AZL5..., software update AZL5...



Display and operating units

AZL52...

Detached unit for flush panel mounting, with backlit text display, 4 x 16 characters, 4 buttons, real-time clock, Modbus and eBus interface for connection to BACS, 6 languages.



Product no. (ASN)	Country group	Languages
AZL52.00B1	Western Europe 1	English (en), German (de), French (fr), Spanish (es), Italian (it), Portuguese (pt)
AZL52.01B1	Eastern Europe 1	English (en), Polish (pl), Hungarian (hu), Czech (cs), Croatian (hr), Slovenian (sl)
AZL52.02B1	Western Europe 2	English (en), Dutch (nl), Danish (da), Swedish (sv), Norwegian (no), Finnish (fi)
AZL52.09B1	Eastern Europe Cyrillic	English (en), Russian (ru), German (de), Bulgarian (bg), Turkish (tr), Romanian (ro)
AZL52.40B1	Western Europe 1 (American parameter sets)	English (en), German (de), French (fr), Spanish (es), Italian (it), Portuguese (pt)

The languages for the country groups can be exchanged with an update of ACS450 (without Eastern Europe Cyrillic).

Sensors and detectors

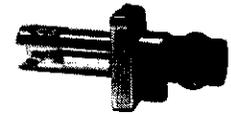
QGO20...

O₂ sensors, the QGO20... are used for acquiring the residual oxygen content in flue gases of natural gas or light oil combustion plant. Together with the control unit, the QGO20... monitors and controls the combustion process.



QRA2...

UV flame detectors, the QRA2... are used for the supervision of gas flames, yellow- / blue-burning oil flames and ignition spark proving in connection with LMV5... burner controls.



QRA4...

UV flame detector, the QRA4... are used for the supervision of gas flames, yellow- / blue-burning oil flames and ignition spark proving in connection with LMV5... burner controls.



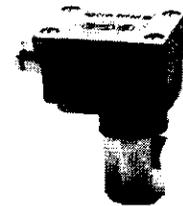
QRA7...

UV flame detectors, the QRA7... are used for the supervision of gas flames, yellow- / blue-burning oil flames and ignition spark proving in connection with LMV5... burner controls.



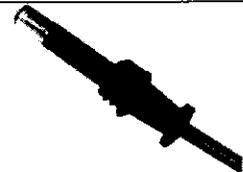
QRA10...

UV flame detectors, the QRA10... are used for the supervision of gas flames, yellow- / blue-burning oil flames and ignition spark proving in connection with LMV5... burner controls.



QRB1...

Photoresistive flame detectors for the supervision of yellow-burning oil flames in connection with LMV5... burner controls, suited for frontal or lateral (90°) illumination.



QRB3...

Photoresistive flame detectors; the QRB3... are used for the supervision of yellow-burning oil flames in connection with LMV5... burner controls, suited for frontal or lateral (90°) illumination.



The products in detail (cont'd)

Sensors and detectors

QR12A2...

Infrared flame detectors, universal detectors for oil and gas flames, suited for both intermittent and continuous operation, with integrated flame signal amplifier and prefabricated connecting cable of 180 cm, **frontal illumination**.

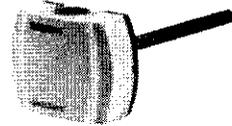


QR12B2...

Infrared flame detectors, universal detectors for oil and gas flames, suited for both intermittent and continuous operation, with integrated flame signal amplifier and prefabricated connecting cable of 180 cm, **lateral illumination**.

QAE21...

Immersion temperature sensors, passive sensor for acquiring the water temperature in pipes and vessels.



FGT-PT1000

Flue gas temperature sensor for acquiring the flue gas temperature in heating plant.



QBE2002-P...

Pressure sensors, for acquiring static and dynamic positive pressures in heating, ventilation or air conditioning plants, particularly in hydraulic and pneumatic systems using liquid or gaseous media (steam applications).

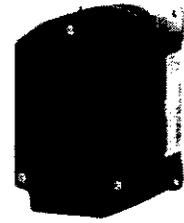


The products in detail (cont'd)

Actuators

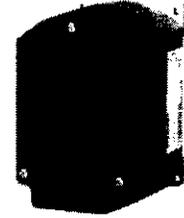
SQM45.291A9

Actuator, rated torque **3 Nm** (reduced holding torque 1.5 Nm), running time 10...120 s, control and feedback signal via CAN bus, stepper motor, front mounting, groove for Woodruff key.



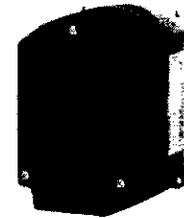
SQM45.295A9

Actuator, rated torque **3 Nm** (reduced holding torque 1.5 Nm), running time 10...120 s, control and feedback signal via CAN bus, stepper motor, front mounting, drive shaft type D.



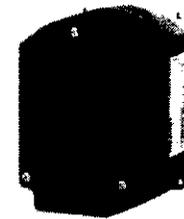
SQM48.497A9

Actuator, rated torque **20 Nm**, running time 30...120 s, control and feedback signal via CAN bus, stepper motor, front mounting, groove for parallel key.



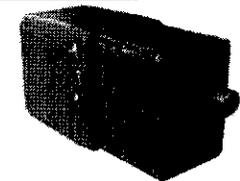
SQM48.697A9

Actuator, rated torque **35 Nm**, running time 60...120 s, control and feedback signal via CAN bus, stepper motor, front mounting, groove for parallel key.



SQM91.391A9

Actuator, rated torque **up to 60 Nm**, running time 30...120 s, control and feedback signal via CAN bus, stepper motor, front mounting, groove for parallel key.

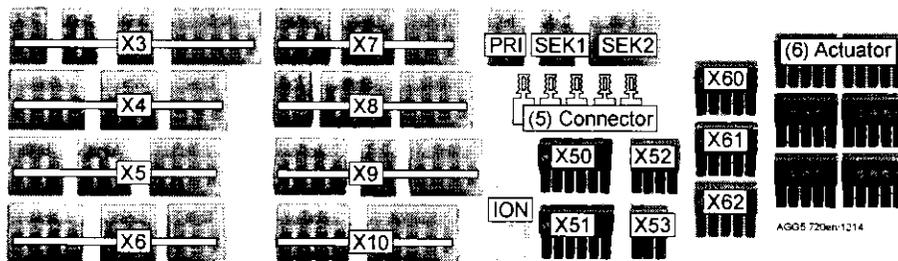


The products in detail (cont'd)

Connector sets

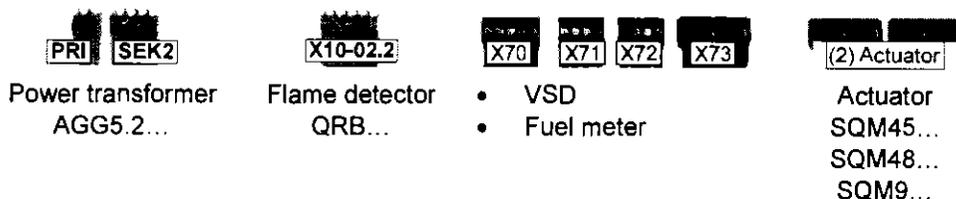
AGG5.720

Standard connector set LMV5... for gas/oil applications with up to 3 actuators.



AGG5.721

Extension connector set LMV5... (complementing AGG5.720, all connection options covered).



Type	Type of plug	Terminal	Example
AGG9.202	RAST5	X3-01	
AGG9.203	RAST5	X3-02	
AGG9.204	RAST5	X3-03	
AGG9.205	RAST5	X8-01	
AGG9.207	RAST5	X9-02	
AGG9.208	RAST5	X10-03	
AGG9.218	RAST5	Primary I	
AGG9.219	RAST5	Secondary I	
AGG9.304	RAST5	X4-02	
AGG9.305	RAST5	X4-03	
AGG9.306	RAST5	X5-01	
AGG9.307	RAST5	X5-02	
AGG9.308	RAST5	X6-02	
AGG9.309	RAST5	X6-03	
AGG9.310	RAST5	X7-01	
AGG9.311	RAST5	X7-02	
AGG9.312	RAST5	X7-03	
AGG9.402	RAST5	X4-01	
AGG9.403	RAST5	X5-03	
AGG9.404	RAST5	X6-01	
AGG9.406	RAST5	X8-02	
AGG9.407	RAST5	X8-03	
AGG9.408	RAST5	X9-01	
AGG9.409	RAST5	X9-03	
AGG9.410	RAST5	X10-01	
AGG9.417	RAST5	Secondary II	
AGG9.501	RAST5	X3-04	
AGG9.502	RAST5	X10-02 pin 1	
AGG9.503	RAST5	X10-02 pin 2	
AGG9.831	RAST3.5	3-pole	
AGG9.841	RAST3.5	4-pole	
AGG9.853	RAST3.5	5-pole	
AGG9.861	RAST3.5	6-pole	

The products in detail (cont'd)

Accessories

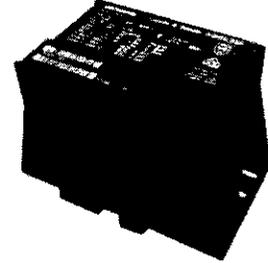
AGG5.110

CAN bus connection shield, angled, for connecting the CAN bus to the basic unit.



AGG5.210

Mains transformer for AC 120 V mains voltage, for CAN bus users, capacity matched to LMV5... system.

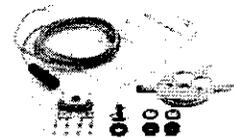


AGG5.220

Mains transformer for AC 230 V mains voltage, for CAN bus users, capacity matched to LMV5... system.

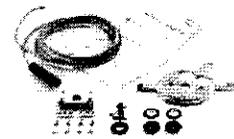
AGG5.310

Speed sensor kit for LMV51.2... and LMV52... systems, consisting of sensor disk 50 mm dia., sensor and mounting kit.



AGG5.315

Speed sensor kit for LMV51.2... and LMV52... systems, consisting of sensor disk 92 mm dia., sensor and mounting kit.



KF8893...

Demo case with LMV5... system, including LMV51.100B..., AZL52.00B1, 2 x SQM45.295A9, AGG5.2..., operating buttons for simulation, electronic simulation of controller system, burner graphics and LEDs.

Supplier: Klein Solutions, Kanadastr. 4, D-58675 Hemer



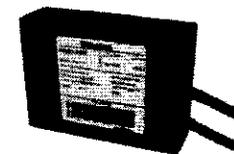
AGO20...

Flue gas collector, accessory for O2 sensor QGO20... for use with LMV52... systems.



AGQ1.2

UV adapter, ancillary unit for UV supervision, cable length 300 mm



AGQ1.3

UV adapter, ancillary unit for UV supervision, cable length 350 mm / 1200 mm

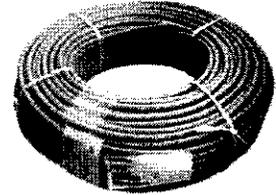
The products in detail (cont'd)

Accessories (cont'd)

Cables

AGG5.631

- CAN bus connecting cable between LMV5... and system components
- Shielded 5-core cable
- Feed lines 2 x 0.5 mm²
- Length 100 m

**AGG5.641**

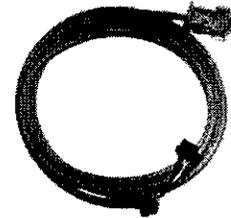
- CAN bus connecting cable between LMV5... and system components
- Shielded 5-core cable
- Feed lines 2 x 1,25 mm²
- Length 100 m

AGG5.633

CAN bus connection cable between basic unit and AZL5, complete with RAST3.5 plug and Sub-D connector (45°, angled), cable length 1 m.

**AGG5.635**

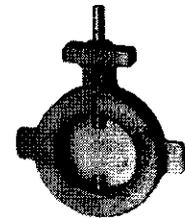
CAN bus connection cable between basic unit and AZL5, complete with RAST3.5 plug and Sub-D plug (straight), cable length 3 m.



Gas damper with mounting kit

VKF41...C

Butterfly valves

**ASK33.4**

Mounting kit for fitting SQM45.295A9 to butterfly valve VKF41...C



Transformer

A5Q20002669

Transformer to increase ionization voltage for AC 120 V devices

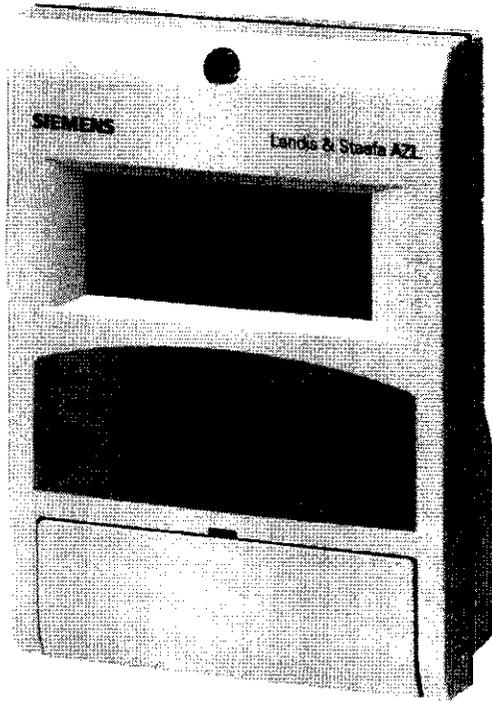


Available documentation

Product no. (ASN)	Description	Documentation no.
A5Q20002669	Ionization current supervision for AC 120 V automatic units	CC1A7541.2
ACS450	PC tool, software	CC1J7550
AGG5.110	CAN bus connection shield	CC1P7550
AGG5.210	Mains transformer	CC1P7550
AGG5.220	Mains transformer	CC1P7550
AGG5.310	Accessory kit speed acquisition	CC1M7550.1
AGG5.315	Inductive sensor	CC1P7550
AGG5.631	CAN bus connecting cable	CC1P7550
AGG5.635	CAN bus connecting cable	CC1P7550
AGG5.641	CAN bus connecting cable	CC1P7550
AGG5.720	Standard connector set	CC1P7550
AGG5.721	Extended connector set	CC1P7550
AGO20...	Flue gas collectors	CC1N7842
AGQ1.2...	UV adapter	CC1P7550
AGQ1.3...	UV adapter	CC1P7550
ASK33.4	Mounting kit	74 319 0916 0
AZL52...	Display and operating units	
	AZL52... Modbus User Manual	CC1A7550
	LMV5 User Documentation	A7550.1
	LMV5 User Documentation	A7550.3
	LMV5 User Documentation	A7550.4
	LMV52 User Documentation	A7550.5
	AZL52... / LMV50... User Manual heating expert	CC1U7550.4
	AZL52... / LMV50... User Manual end user	CC1U7550.5
	AZL52... / LMV51... User Manual heating expert	CC1U7550
	AZL52... / LMV51... User Manual end user	CC1U7550.1
	AZL52... / LMV52... User Manual end user	CC1U7550.2
	AZL52... / LMV52... User Manual heating expert	CC1U7550.3
	Communication via Modbus with S7	CC1J7553
	Communication via Modbus with S7-1200	CC1J7556
FGT-Pt1000	Flue gas temperature sensor	CE1N1846
KF8893...	Demo case	CC1B7988
LMV5...	Burner management system	
	Setting and error lists	CC1I7550
	Data Sheet	CC1N7550
	Basic Documentation	CC1P7550
	Product range	CC1Q7550
	Installation basics	CC1J7550.1
QAE21...	Immersion temperature sensors	CE1N1781
QBE2002-P...	Pressure sensors	CE1N1909
QGO20...	O2 sensors	
	Data Sheet	CC1N7842
	Basic Documentation	CC1P7842
QRA2...	UV flame detectors	CC1N7712
QRA4...	UV flame detector	CC1N7711
QRA7...	UV flame detectors	CC1N7712
QRA10...	UV flame detectors	CC1N7712
QRB1...	Photoresistive flame detectors	CC1N7714
QRB3...	Photoresistive flame detectors	CC1N7714
QRI2...	Infrared flame detectors	CC1N7719

PLL52...	CAN bus modules	CC1P7550
SQM4...	Actuators	CC1N7814
SQM9...	Actuators	CC1N7818
VKF41...	Double dampers	CC1N7632
	Assembly of a gas damper VKF41	74 319 0916 0

SIEMENS



AZL...
Modbus

User Documentation

Supplementary documentation

Type of product	Type of documentation	No. of documentation
LMV5...	User Documentation Basic diagram for LMV5... with 2 types of gases	A7550.1
LMV5...	User Documentation Basic diagram for LMV5... with 2 types of liquefied fuels	A7550.3
LMV5...	User Documentation Assembly of VKF41...C gas damper with ASK33.4 mounting kit to the SQM45.295A9 actuator	A7550.4
LMV52...	User Documentation COx supervision and control	A7550.5
LMV5...	Setting Lists (parameter and error list)	I7550
ACS450	Operating Instructions	J7550
LMV5...	Installation Basics	J7550.1
LMV5...	Data Sheet	N7550
LMV5...	Basic Documentation	P7550
LMV5...	Product Range Overview This document contains a complete overview	Q7550
AZL52 / LMV51	Operating Instructions	U7550
AZL52 / LMV51	Operating Instructions	U7550.1
AZL52 / LMV52	Operating Instructions	U7550.2
AZL52 / LMV52	Operating Instructions	U7550.3
AZL52 / LMV50	Operating Instructions	U7550.4
AZL52 / LMV50	Operating Instructions	U7550.5
SQM45 / SQM48	Data Sheet	N7814
SQM9...	Data Sheet	N7818
QGO20...	Data Sheet	N7842
QGO20	Basic Documentation	P7842

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General

LMV5... 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.

AZL... The burner management system is operated and programmed with the help of the AZL5... display and operating unit or a PC tool.
The Modbus functionality of the AZL... display and operating unit serves for integrating the LMV5... burner management system into a Modbus-based data network.
This makes possible the following applications:

- Visualization of plant operating states
- Plant control
- Logging

Master-slave principle

Communication between Modbus users takes place according to the master-slave principle.

The AZL... always works as a slave.

Data transmission

Transmission mode (RTU)

- The transmission mode used is RTU (Remote Terminal Unit)
- Data are transmitted in binary format (hexadecimal) with 8 bits
- The LSB (least significant bit) is transmitted first
- ASCII operating mode is not supported

Structure of data blocks

All data blocks use the same structure:

Data structure	Slave address	Function code	Data field	Checksum CRC16
	1 byte	1 byte	x byte	2 bytes

Every data block contains 4 fields:

Slave address	Device address of a certain slave
Function code	Function selection (reading / writing words)
Data field	Contains the following information: <ul style="list-style-type: none"> - Word address - Number of words - Word value
Checksum	Identification of transmission errors

Checksum (CRC16)

The checksum (CRC16) is used to detect transmission errors. If, during evaluation, an error is detected, the relevant device will not respond.

Calculation scheme

CRC = 0xFFFF	
CRC = CRC XOR ByteOfMessage	
For (1 through 8)	
CRC = SHR (CRC)	
if (flag shifted at right = 1)	
then	else
CRC = CRC XOR 0xA001	
while (not all ByteOfMessage handled)	



Note!

The low-byte of the checksum is transmitted first.

Example

Data query: Reading 2 words from address 6 (CRC16 = 0x24A0)

0B	03	00	06	00	02	A0	24	
							CRC16	

Reply: (CRC16 = 0x0561)

0B	03	04	00	00	42	C8	61	05
					Word 1		Word 2	
							CRC16	

Mapping words

B0	B1	B2	B3	B4	B5	B6	B7	B8	B9	B10	B11	B12	B13	B14	B15
Byte High								Byte Low							

Transmission mode: The LSB (least significant bit) is transmitted first.

Mapping long values

Byte High	Byte Low	Byte High	Byte Low
Word Low		Word High	

Communication process

Start and end of a data block are characterized by transmission pauses. The maximum permissible time between 2 successive characters is 3.5 times the time required for the transmission of once character.

The character transmission time is dependent on the Baud rate and the data format used.

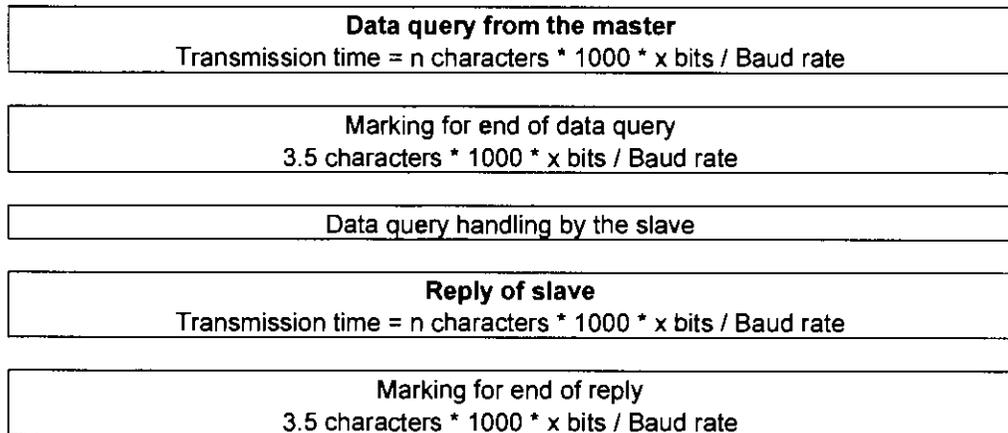
Having a data format of 8 data bits, no parity bit and one stop, the character transmission time is calculated as follows:

$$\text{Character transmission time [ms]} = 1000 * 9 \text{ bits} / \text{Baud rate}$$

And with other data formats:

$$\text{Character transmission time [ms]} = 1000 * 10 \text{ bits} / \text{Baud rate}$$

Process



Example

Marking for data query or end of reply with data format 10 / 9 bits

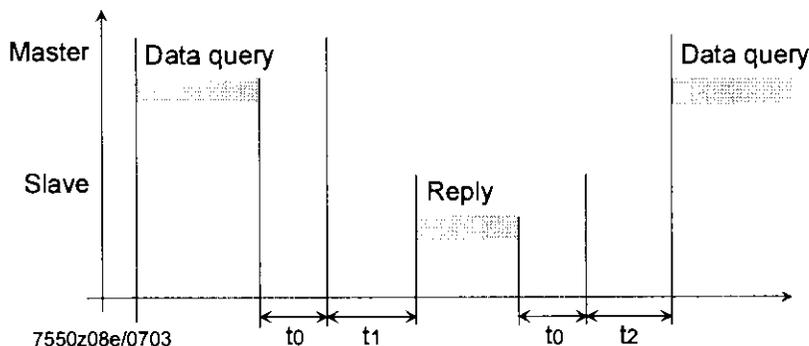
$$\text{Waiting time} = 3.5 \text{ characters} * 1000 * x \text{ bits} / \text{Baud rate}$$

Baud rate [Baud]	Data format [bit]	Waiting time [ms]
9600	10	3.125
	9	2.813

Data query process

Time diagram

A data query is made according to the following time diagram:



where:

- t0 Marking for end = 3.5 characters (time is dependent on the Baud rate)
- t1 This time is dependent on internal handling; the maximum handling time is dependent on the data type (internal and external data) and on the number of data; for more detailed information, see below!
- t2 $t2 \geq 20$ ms
This time is required by the device to switch from transmitting back to receiving; this time must be observed by the master before a new data query is made; it must always be observed, even if a new data query to some other device is made

Communication during the slave's internal handling time

During the slave's internal handling time, the master is not allowed to make any data queries. The slave ignores data queries made during this period of time.

Communication during the slave's reply time

During the slave's reply time, the master is not allowed to make any data queries. Data queries made during this period of time cause all data on the bus at this instant to be deleted.

Number of messages

The number of addresses per message are limited:

- 20 addresses of the size of one word when reading
- 6 addresses of the size of one word when writing

Reply time of AZL... to a message from the master

1. Reading data from the LMV5... system:

1...3 addresses	25...75 ms
4...9 addresses	75...125 ms
10...15 addresses	125...175 ms
16...20 addresses	175...225 ms

Note!



These periods of time are defined from the complete writing of the message from the master to sending the first byte by the AZL...

2. Writing data to the LMV5... system:

1 address	25...75 ms
2...3 addresses	75...125 ms
4...5 addresses	125...175 ms
6 addresses	175...225 ms

Modbus functions

The following Modbus functions are supported:

Function number	Function
03 / 04	Reading n words
06	Writing 1 word
16	Writing n words

For more information about the Modbus protocol, refer to www.modbus.org.

Table of addresses

Function	Address	Number of words	Data designation	Access	Data format	Data type / coding	Range	Updating rate
03/04	0	1	Phase	R	U16		0...255	Fast
03/04	1	1	Position of currently active fuel actuator	R	S16	PT_WINKEL	-3...93°	Fast
03/04	2	1	Position of gas actuator	R	S16	PT_WINKEL	-3...93°	Fast
03/04	3	1	Position of oil actuator	R	S16	PT_WINKEL	-3...93°	Fast
03/04	4	1	Position of air actuator	R	S16	PT_WINKEL	-3...93°	Fast
03/04	5	1	Position of auxiliary actuator 1	R	S16	PT_WINKEL	-3...93°	Fast
03/04	6	1	Position of auxiliary actuator 2	R	S16	PT_WINKEL	-3...93°	Fast
03/04	7	1	Position of auxiliary actuator 3	R	S16	PT_WINKEL	-3...93°	Fast
03/04	8	1	Manipulated variable for variable speed drive	R	S16	PT_PROZENTFU	0...100 %	Fast
03/04	9	1	Current type of fuel	R	U16	0= Gas 1= Oil	0...1	Fast
03/04	10	1	Current output	R	U16	PT_LEISTUNG	0...100 %	Fast
03/04	11	1	Current setpoint / temperature / pressure	R	U16	PT_TEMP_ DRUCK		Medium
03/04	12	1	Actual value / temperature / pressure Unit: See address 18 / 19	R	U16	PT_TEMP_ DRUCK	0...2000 °C 0...100 bar	Medium
03/04	13	1	Flame signal	R	U16	PT_PROZENT01	0...100 %	Medium
03/04	14	1	Current fuel throughput	R	U16	0.65534		Fast
03/04	15	1	Current O2 value (LMV52...)	R	U16	PT_PROZENT01	0...100 %	Fast
03/04	16	1	Volume unit of gas	R	U16	0= m³ 1= ft³	0...1	Slow
03/04	17	1	Volume unit of oil	R	U16	0= l 1= gal	0...1	Slow
03/04	18	1	Unit of temperature	R	U16	0= °C 1= °F	0...1	Slow
03/04	19	1	Unit of pressure	R	U16	0= bar 1= psi	0...1	Slow
03/04	20	1	Sensor selection	R	U16	0=Pt100 1=Pt1000 2=Ni1000 3=temp. sensor 4=press. sensor 5=Pt100Pt1000 6=Pt100Ni1000 7=no sensor	0...7	Slow
03/04	21	2	Startup counter total	R	S32		0...999999	Slow
03/04	23	2	Hours run counter	R	S32		0...999999	Slow
03/04	25	1	Current error: Error code	R	U16		0...0x FF	Fast
03/04	26	1	Current error: Diagnostic code	R	U16		0...0x FF	Fast
03/04	27	1	Current error: Error class	R	U16		0...5	Fast
03/04	28	1	Current error: Error phase	R	U16		0...255	Fast
03/04	29	1	Temperature limiter OFF threshold, in degrees Celsius / Fahrenheit (in address 129: Temperature limiter switching differential ON)	R	U16		0...2000 °C 32...3632 °F	Slow
03/04	30	1	Supply air temperature, in degrees Celsius / Fahrenheit (LMV52...)	R	U16		-100...+923 °C -148...+1693 °F	Slow
03/04	31	1	Flue gas temperature, in degrees Celsius / Fahrenheit (LMV52...)	R	U16		-100...+923 °C -148...+1693 °F	Slow
03/04	32	1	Combustion efficiency (LMV52...)	R	U16	PT_Prozent01	0...200 %	Slow

Function	Address	Number of words	Data designation	Access	Data type / coding	Range	Updating rate				
03/04	35	1	Inputs	R	U16	-	Medium				
Coding: 0 → inactive 1 → active											
<table border="0" style="width:100%; border-collapse: collapse;"> <tr> <td style="width:50%; border-bottom: 1px solid black; text-align: center;"> B15 B14 B13 B12 B11 B10 B9 B8 </td> <td style="width:50%; border-bottom: 1px solid black; text-align: center;"> B7 B6 B5 B4 B3 B2 B1 B0 </td> </tr> <tr> <td style="vertical-align: top; padding: 5px;"> B8 Safety loop B9 B10 Pressure switch-min-gas B11 Pressure switch-max-gas B12 B13 LP B14 Start release oil B15 Heavy oil immediate start </td> <td style="vertical-align: top; padding: 5px;"> B0 Controller ON/OFF B1 Fan contactor contact B2 Fuel selection oil B3 Fuel selection gas B4 B5 Pressure switch-max-oil B6 Pressure switch-min-oil B7 Pressure switch – valve proving </td> </tr> </table>								B15 B14 B13 B12 B11 B10 B9 B8	B7 B6 B5 B4 B3 B2 B1 B0	B8 Safety loop B9 B10 Pressure switch-min-gas B11 Pressure switch-max-gas B12 B13 LP B14 Start release oil B15 Heavy oil immediate start	B0 Controller ON/OFF B1 Fan contactor contact B2 Fuel selection oil B3 Fuel selection gas B4 B5 Pressure switch-max-oil B6 Pressure switch-min-oil B7 Pressure switch – valve proving
B15 B14 B13 B12 B11 B10 B9 B8	B7 B6 B5 B4 B3 B2 B1 B0										
B8 Safety loop B9 B10 Pressure switch-min-gas B11 Pressure switch-max-gas B12 B13 LP B14 Start release oil B15 Heavy oil immediate start	B0 Controller ON/OFF B1 Fan contactor contact B2 Fuel selection oil B3 Fuel selection gas B4 B5 Pressure switch-max-oil B6 Pressure switch-min-oil B7 Pressure switch – valve proving										

Function	Address	Number of words	Data designation	Access	Data type / coding	Range	Updating rate				
03/04	37	1	Outputs	R	U16	-	Medium				
Coding: 0 → inactive 1 → active											
<table border="0" style="width:100%; border-collapse: collapse;"> <tr> <td style="width:50%; border-bottom: 1px solid black; text-align: center;"> B15 B14 B13 B12 B11 B10 B9 B8 </td> <td style="width:50%; border-bottom: 1px solid black; text-align: center;"> B7 B6 B5 B4 B3 B2 B1 B0 </td> </tr> <tr> <td style="vertical-align: top; padding: 5px;"> B8 Fuel valve SV oil B9 Fuel valve V1 oil B10 Fuel valve V2 oil B11 Fuel valve V3 oil B12 Fuel valve SV gas B13 Fuel valve V1 gas B14 Fuel valve V2 gas B15 Fuel valve PV gas </td> <td style="vertical-align: top; padding: 5px;"> B0 Alarm B1 B2 B3 B4 Ignition B5 Start signal / DW valve B6 Fan B7 Oil pump / magnetic coupling </td> </tr> </table>								B15 B14 B13 B12 B11 B10 B9 B8	B7 B6 B5 B4 B3 B2 B1 B0	B8 Fuel valve SV oil B9 Fuel valve V1 oil B10 Fuel valve V2 oil B11 Fuel valve V3 oil B12 Fuel valve SV gas B13 Fuel valve V1 gas B14 Fuel valve V2 gas B15 Fuel valve PV gas	B0 Alarm B1 B2 B3 B4 Ignition B5 Start signal / DW valve B6 Fan B7 Oil pump / magnetic coupling
B15 B14 B13 B12 B11 B10 B9 B8	B7 B6 B5 B4 B3 B2 B1 B0										
B8 Fuel valve SV oil B9 Fuel valve V1 oil B10 Fuel valve V2 oil B11 Fuel valve V3 oil B12 Fuel valve SV gas B13 Fuel valve V1 gas B14 Fuel valve V2 gas B15 Fuel valve PV gas	B0 Alarm B1 B2 B3 B4 Ignition B5 Start signal / DW valve B6 Fan B7 Oil pump / magnetic coupling										

Function	Address	Number of words	Data designation	Access	Data format	Data type / coding	Range	Updating rate
R 03/04 W 06/16	38	1	Program stop	RW*	U16	0=deactivated 1=24 PrePurgP 2=32 PrePFGR 3=36 IgnitPos 4=44 Interv 1 5=52 Interv 2 6=72 PostPPos 7=76 PostPFGR	0...7	Slow
R 03/04 W 06/16	39	1	Operating mode with load controller	RW*	U16	0=ExtLC X5-03 1=IntLC 2=IntLC Bus 3=IntLC X62 4=ExtLC X62 5=ExtLC Bus	0...5	Slow
R 03/04	40	1	Selection of manual or automatic operation	R	U16	0=automatic 1= Manual 2=burner off	0...2	Fast
R 03/04 W 06/16	41	1	Modbus mode: Local / Remote	RW	U16	0 = Local 1 = Remote	0...1	Slow

Function	Address	Number of words	Data designation	Access	Data format	Data type / coding	Range	Updating rate
R 03/04 W 06/16	42	1	Modbus downtime: Max. time with no communication. When this time has elapsed, automatic changeover from Remote to Local takes place	R/W*	U16		0...7200 s	Slow
R 03/04 W 06/16	43	1	Operating mode in Remote mode.	R/W	U16	0 = Automatic 1 = Manual 2 = Burner OFF	0...2	Fast
R 03/04 W 06/16	44	1	External setpoint W3 Unit: See address 18 / 19	R/W	U16	PT_TEMP_ DRUCK	See "Data types" on page 15	Fast
R 03/04 W 06/16	45	1	Predefined output mod. / multistage	R/W	U16	PT_LEISTUNG	See "Data types" on page 15	Fast
R 03/04 W 06/16	46	1	Fuel selection AZL...	R/W*	U16	0 = Gas 1 = Oil	0...1	Slow
R 03/04 W 06/16	47	1	Setpoint W1	R/W	U16	PT_TEMP_ DRUCK	See "Data types" on page 15	Slow
R 03/04 W 06/16	48	1	Setpoint W2	R/W	U16	PT_TEMP_ DRUCK	See "Data types" on page 15	Slow
R 03/04 W 06/16	49	1	Weekday	R/W	U16	0 = Sunday 1 = Monday ...	0...6	Slow
R 03/04 W 16	50	3	Date	R/W	U16[3]	Data structure Date		Slow
R 03/04 W 16	53	3	Time of day	R/W	U16[3]	Data structure Time of day		Slow
R 03/04 W 16	56	2	Hours run gas (adjustable)	R/W*	S32		0...999999 h	Slow
R 03/04 W 16	58	2	Hours run oil stage 1 or modulating (adjustable)	R/W*	S32		0...999999 h	Slow
R 03/04 W 16	60	2	Hours run oil stage 2 or modulating (adjustable)	R/W*	S32		0...999999 h	Slow
R 03/04 W 16	62	2	Hours run oil stage 3 or modulating (adjustable)	R/W*	S32		0...999999 h	Slow
R 03/04 W 16	64	2	Hours run total (can be reset)	R/W*	S32		0...999999 h	Slow
03/04	66	2	Hours run total (read only)	R	S32		0...999999 h	Slow
03/04	68	2	Hours run device connected to power (read only)	R	S32		0...999999 h	Slow
R 03/04 W 16	70	2	Startup counter gas (adjustable)	R/W*	S32		0...999999	Slow
R 03/04 W 16	72	2	Startup counter oil (adjustable)	R/W*	S32		0...999999	Slow
R 03/04 W 16	74	2	Startup counter total (can be reset)	R/W*	S32		0...999999	Slow
03/04	76	2	Startup counter total (read only)	R	S32		0...999999	Slow
03/04	78	2	Fuel volume gas (read only) (resettable from AZL5... version V4.10) 0...199999999.9 m³ 0...1999999999 ft³	R/W*	S32		See "Data types" on page 15	Slow

Function	Address	Number of words	Data designation	Access	Data format	Data type / coding	Range	Updating rate
03/04	80	2	Fuel volume oil (read only) (resettable from AZL5... version V4.10) 0...199999999.9 l 0...199999999.9 gal	R/W*	S32		See "Data types" on page 15	Slow
03/04	82	1	Number of lockouts	R	U16		0...65535	Slow
03/04	83	1	Extra temperature sensor (from AZL5... version V4.10)	R	U16	°C: *1 °F: *1	0..2000 °C 32..3632 °F	Slow
Parameters 84...137 are available from AZL5... version V4.20								
03/04	84	8	AZL5... ASN	R	U8[16]	String		Constant
03/04	92	1	AZL5... parameter set code	R	U16			Constant
03/04	93	1	AZL5... parameter set version	R	U16			Constant
03/04	94	3	AZL5... identification date	R	U16[3]	Date		Constant
03/04	97	1	AZL5... identification number	R	U16			Constant
03/04	98	8	Burner control ASN	R	U8[16]	String		Constant
03/04	106	1	Burner control parameter set code	R	U16			Constant
03/04	107	1	Burner control parameter set version	R	U16			Constant
03/04	108	3	Burner control identification date	R	U16[3]	Date		Constant
03/04	111	1	Burner control identification number	R	U16			Constant
03/04	112	1	Software version AZL5...	R	U16	Hexadecimal		Constant
03/04	113	1	Software version burner control	R	U16	Hexadecimal		Constant
03/04	114	1	Software version load controller	R	U16	Hexadecimal		Constant
03/04	115	8	Burner identification	R	U8[16]	String		Upon reset
03/04	123	1	Min-output gas	R	U16	PT_LEISTUNG	0...100 %	Slow
03/04	124	1	Max-output gas	R	U16	PT_LEISTUNG	0...100 %	Slow
03/04	125	1	Min-output oil	R	U16	PT_LEISTUNG	0...100 % 1001...1003	Slow
03/04	126	1	Max-output oil	R	U16	PT_LEISTUNG	0...100 % 1001...1003	Slow
R 03/04 W 16	127	1	Load limitation enduser (modulating)	R/W*	U16	PT_LEISTUNG	0...100 %	Slow
R 03/04 W 16	128	1	Load limitation enduser (multistage)	R/W*	U16	0: S1 1: S2 2: S3	0...2	Slow
03/04	129	1	Temperature limiter switching differential ON (in address 29: Temperature limiter OFF threshold, in degrees Celsius / Fahrenheit)	R	S16	PT_Prozent1	-50...0 %	Slow
03/04	130	1	Measuring range temperature sensor	R	U16	0: 150°C / 302°F 1: 400°C / 752°F 2: 850°C / 1562°F	0..2	Slow
03/04	131	1	Adaption active / inactive	R	U16	0: Inactive 1: Active	0...1	Fast
03/04	132	1	Adaption state	R	U16	PT_ADAPTION	0...12	Slow
R 03/04 W 16	133	1	Start adaption	R/W	U16	0: Reset value 1: Start 2: Abort	0...2	Slow
R 03/04 W 16	134	1	Adaption output Permissible values: 40 %, 50 %, 60 %, 70 %, 80 %, 90 %, 100 %	R/W*	U16	PT_Prozent1	40...100 %	Slow
R 03/04 W 16	135	1	P-value	R/W*	U16	PT_Prozent01	2...500 %	Slow
R 03/04 W 16	136	1	I-value	R/W*	U16	Seconds	0...2000 s	Slow

Function	Address	Number of words	Data designation	Access	Data format	Data type / coding	Range	Updating rate
R 03/04 W 16	137	1	D-value	R/W*	U16	Seconds	0...1000 s	Slow
03/04	400	16	Lockout history (current lockout)	R	U16/U32 □			Fast
03/04	416	16	Lockout history (current lockout -1)	R	U16/U32 □			Fast
03/04	432	16	Lockout history (current lockout -2)	R	U16/U32 □			Fast
:	:	:	:	:	:			
03/04	528	16	Lockout history (current lockout -8)	R	U16/U32 □			Fast
03/04	544	8	Error history (current error)	R	U16/U32 □			Fast
03/04	552	8	Error history (current error -1)	R	U16/U32 □			Fast
:	:	:	:	:	:			
03/04	704	8	Error history (current error -20)	R	U16/U32 □			Fast

1) Refer to section «Data structures»

* These parameters need not be continually written since they are stored in EEPROM, which only permits a limited number of write accesses over its lifecycle (< 100,000)

Data structures

Date	U16	Year Month Day
Time of day	U16	Hour Minute Second
Lockout history	U16	Error code Error diagnostics Error class Error phase Fuel Output Date: Year Date: Month Date: Day Time of day: Hours Time of day: Minutes Time of day: Seconds
	U32	Startup counter total Hours run total
Error history	U16	Error code Error diagnostics Error class Error phase Fuel Dummy Output
	U32	Startup counter total

Legend to address table

Access	R	Value can only be read
	R / W	Value can be read and written
Data format	U16	16 bit integer, not subject to sign
	S32	32 bit integer, subject to sign



Note:
In the AZL..., this data type is also used to mark an invalid or non-available value by using the value of «-1»

[]

Data array

Data types

TYPE	Phys.	Int. range	Resolution	Conversion int. / phys.
PT_PROZENT01	0...100 %	0...1000	0.1 %	/ 10
PT_PROZENTFU	0...110 %	0...1100	0.1 %	/ 10
PT_WINKEL	-3.0...93.0°	-30...930	0.1°	/ 10
PT_TEMP_	0...2000°	0...2000	1 °C	1
DRUCK	32...3632 °F	32...3632	1 °F	1
	0...100 bar	0...1000	0.1 bar	/ 10
	0...1449 psi	0...1449	1 psi	1
PT_LEISTUNG	Modulating operation: 0...100 % Multistage operation: 1001 = stage 1 1002 = stage 2 1003 = stage 3	0...1003	Modulating operation: 0.1 % Multistage operation: 1	Modulating operation: / 10 Multistage operation: - 1000
PT_ADAPTION	0: Undefined 1: Identification completed, parameter determined 2: Undefined 3: Adaption aborted by user 4: Temperature differential too small, temperature will be lowered with low-fire 5: Monitoring time running 6: Delivery of identification load set 7: Error during identification (path) 8: Error during identification (internally) 9: Monitoring time running 10: Changeover from modulating to multistage during an identification 11: Timeout monitoring time 12: Timeout heating output on path with monitoring			

Starting adaption via Modbus

The routine used for identifying the path in the integrated load controller (termed "adaption" here) of the LMV5... system can be controlled and monitored via Modbus.

In principle, the general conditions are the same as those used when making adaptations with the AZL52... (refer to subsection 6.4.2 *Self-setting of control parameters (adaption)*) in the Basic Documentation of the LMV5... system (P7550).

The terms *Start adaption*, *Adaption active / inactive* and *Adaption state* indicate the respective Modbus addresses (refer to "Table of addresses").

Start the adaption via *Start adaption* and change the value from $\neq 1$ to $= 1$.
Starting the adaption has no impact on adaption processes already under way (*Adaption active / inactive* = 1).

If *Adaption active / inactive* = 1, the process can be monitored via *Adaption state* (refer to data type PT_ADAPTION).

When *Adaption active / inactive* = 0, the adaption process is completed.

On completion of the process, the result can be read out via *Adaption state*.

To complete the adaption process prematurely, the value at *Start adaption* must be changed from $\neq 2$ to $= 2$.

Updating rate of AZL...

Fast	System data that have already been updated automatically by the system process are available on request, at a typical repetition rate of 200 ms.
Medium	These data are cyclically queried in the system by the AZL... The typical updating rate here is 5 seconds, depending on system load.
Slow	These data are cyclically queried in the system by the AZL... The typical updating rate that can be expected here is 25 seconds, depending on system load.
Constant	These data are updated in the system by the AZL5... upon each <i>Power On</i> or reset. When making a query, the updated data will be available after 25 seconds. Data that cannot be changed (e.g. the production date, etc.) – neither with the AZL5... nor via the ACS450 – can be identified by the value of 0 in the first Byte of the strings.
Upon reset	Same as constant data, but these data can be changed in the system.

Error handling



Error codes

When there are faulty telegrams (CRC errors, etc.), the AZL... does not send any exception code. It does not respond to this kind of message.

Reason: Usually, the commercially available Modbus drivers do not respond to exception codes.



Selection menus in the AZL...

Activation of Modbus operation

Activation takes place via menu
«Operation» → «OptgModeSelect» → «GatewayBASon».

Having made the selection, the menu item can be quit via ESC. The setting is retained until «Operation» → «OptgModeSelect» → «GatewayBASoff» is selected via the AZL... menu.

When «GatewayBASon» is activated, plant operation and diagnostics via the AZL... are still possible.

Deactivation takes place via menu
«Operation» → «OptgModeSelect» → «GatewayBASoff».

Slave address

Selection is made via menu
«Params & Display» → «AZL» → «Modbus» → «Address».

According to Modicon specifications, addresses between 1...247 can be selected. The slave address is filed in nonvolatile memory of the AZL...

Transmission parameters

Transmission rate The setting is made via menu
«Params & Display» → «AZL» → «Modbus» → «Baud Rate»
There is a choice of 9600 bit/s or 19200 bit/s.

Parity Using the AZL... menu
«Params & Display» → «AZL» → «Modbus» → «Parity», parity can be set to
«none», «even» or «odd».

Timeout communication failure

When there is no Modbus communication, this timeout defines the period of time on completion of which the AZL... changes automatically from Remote to Local.

The setting is made via menu
«Params & Display» → «AZL» → «Modbus» → «Downtime».

Local «-» Remote mode

This setting defines whether the AZL... shall work in Local or Remote mode.

Remote mode

Display of «Remote Automatic», «Remote Manual», «Remote Burner OFF» mode. A change can only be made via Modbus.

AZL5... interface

General

The AZL... serves the Modbus via its COM2 port (8-pole Western jack RJ45). The port is assigned to the functional low-voltage range.

Assignment of RJ45 pins:

PIN	
1	TXD (RS-232 level or V28)
2	Not used
3	RXD (RS-232 level or V28)
4	GND
5	U1 (typically +8.2V)
6	GND
7	U2 (typically -8.2V)
8	Not used



Attention!

When preparing and fitting a connecting cable between the AZL... and a converter, it is to be noted that PIN 5 and PIN 7 can deliver a current of 5 mA each. Adequate insulation against other potentials must be ensured.

The maximum permissible data line length between COM2 and a converter is 3 m. In exceptional cases, this data line length can be exceeded, depending on environmental conditions (electrical interference) and the type of cable used – without Siemens assuming responsibility.

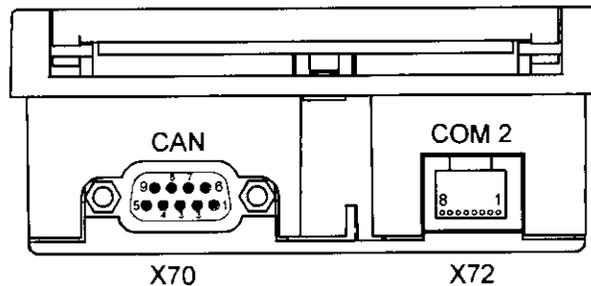


Attention!

To ensure protection against electric shock hazard, it must be made certain that AC 230 V / AC 120 V lines are strictly separated from the functional low-voltage area.

CAN X70

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

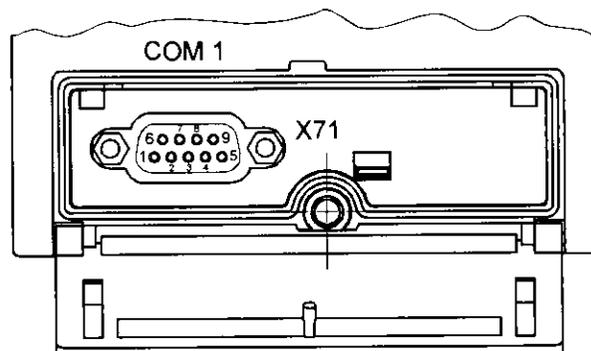


COM2 X72

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

COM1 X71

PIN	
2	RXD
3	TXD
5	GND



7550209/0703



Note!

COM1 (PC port) and COM2 cannot be active at the same time!

Converter RS-232 – RS-485

This converter converts a V.24 / RS-232 port into an RS-485 port.

Technical requirements

- Code transparency, that is, data must remain unchanged
- When using the RS-485 interface as a bus, control of the transmitting section on the RS-485 side must be ensured by the transmitter power of the AZL...
- The interfaces must be galvanically separated to improve EMC

Commercially available converters

The technical specification provided by the suppliers of the converters must be observed when doing planning work. Some of them do not meet the specifications of the LMV5... system (e.g. operating temperatures). If required, technical measures must be taken (e.g. suitable location).

The following types of converters have been tested by us with respect to function and immunity (voltage surges):

- Supplier: Hedin Tex
Type reference: H-4

Contact address in Germany:
Hedin Tex GmbH
Am Herrkamp 14
D-24226 Heikendorf
www.hedintex.de

- Supplier: IPC CON
Type reference: I-7520

Contact address in Germany:
Spectra Computersysteme GmbH, Humboldtstraße 36
D-70771 Leinfelden-Echterdingen
*www.spectra.de

Connection example: Connecting cable for interface converter type Hedin Tex H4/M4

AZL COM2 8-pole Western		Cable	Hedin Tex interface converter X1 RS-232	
			H4	M4
1	TxD		21	2
2	—		—	—
3	RxD		22	3
4	GND		16	7
5	U1		(only for eBus adapter)	
6	GND		—	—
7	U2		(only for eBus adapter)	
8	—		—	—

7550x05e/0703

Notes on operating modes

Modbus downtime

When there is no more communication between DDC and AZL..., the Modbus downtime is used to switch over from Remote mode to the preselected setpoint in Local mode. The timer will be activated when changing from Local to Remote. With every permissible Modbus communication to this slave (AZL...), the timer will be reloaded. Should the timer lapse, the DDC must again set the Remote mode, if required. The timer value will be retained in EEPROM and will also be retained after power off.

Note!



When deactivating the «Gateway DDC» mode (menu item «**OptgModeSelect**» → «**GatewayBASoff**»), automatic changeover to Local takes place, that is, preselected output «W1» will apply.

Changeover of operating mode via parameter 43

This changeover was introduced primarily because of the requirements of boiler sequence control.

In that case, the individual boiler can be operated at low output via manually «On».

When switching to «Auto» via sequence control, preselected output «W3» will be used.

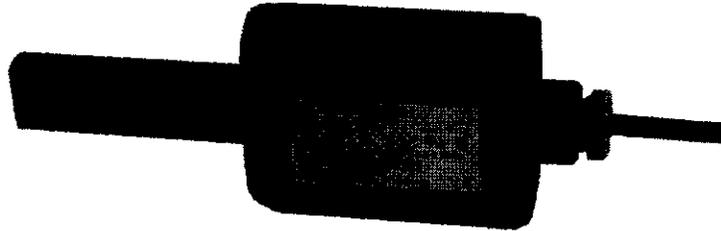
Addendum 2: Default parameter settings

Parameter	Address	Storage location	Preselection	Choices for making changes
Setpoint W1	47	EEPROM	See Basic Documentation «Menu and parameter lists»	<ul style="list-style-type: none"> • On the AZL... (menu) • Preselection via Modbus
Setpoint W2	48	EEPROM	See Basic Documentation «Menu and parameter lists»	<ul style="list-style-type: none"> • On the AZL... (menu) • Preselection via Modbus
External setpoint W3	44	RAM	«0» will be reinitialized when resetting the AZL...	<ul style="list-style-type: none"> • On the AZL... (menu) • Preselection via Modbus
Set target load mod / multistage	45	RAM	«0» will be reinitialized when resetting the AZL...	<ul style="list-style-type: none"> • On the AZL... (menu) • Preselection via Modbus
Local / Remote	41	RAM	«Local»	<ul style="list-style-type: none"> • Via Modbus • On the AZL... (menu) • Via lapse of timer «Communication failure» from Remote to Local
Selection of manual or automatic operation	40	EEPROM	See Basic Documentation «Menu and parameter lists»	<ul style="list-style-type: none"> • On the AZL... (menu)
Operating mode: Remote "off" / remote "on" / W3	43	RAM	«Auto» will be reinitialized when resetting the AZL...	<ul style="list-style-type: none"> • Preselection via Modbus
Operating mode with load controller	39	EEPROM	See Basic Documentation «Menu and parameter lists»	



Note!

An AZL... reset will be triggered when switching power on, or in the event of severe system errors.



Infrared Flame Detectors

QRI...

Infrared flame detectors for use with Siemens burner controls, for the supervision of gas, oil and other flames that emit infrared light. The QRI... are suited for burners of any capacity, either in continuous or intermittent operation.

The QRI... and this Data Sheet are intended for use by OEMs which integrate the flame detectors in their products.

Use, features

Key features of the QRI... flame detectors:

- Detector with infrared-sensitive flame detecting element
- Integrated flame signal amplifier
- Designed for frontal and lateral (90°) illumination
- Suited for use with burner controls type LMV5...
- Secured to the burner with flange and clamp

The spectral sensitivity of the QRI... is a maximum of about 2 μm covering infrared radiation emitted by gas, oil, and coal flames as well as other sources of infrared light. Owing to electronic self-supervision of the flame signal, the QRI... can be used in connection with suitable burner controls designed for burners in continuous or intermittent operation.

The sensitivity of the QRI... is such that it must be fitted behind the burner's baffle plate.



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

Do not open, interfere with or modify the flame detector!

- All activities (mounting, installation and service work etc.) must be performed by qualified staff. If not observed, there is a risk of impairment of safety functions and of electric shock hazard
- Before carrying out any work on the flame detector, isolate the power supply completely (all-polar disconnection). Ensure that the plant cannot be inadvertently switched on again and that it is indeed isolated.
If not observed, there is a risk of electric shock hazard
- Ensure protection against electric shock hazard by providing adequate protection for the burner control's connection terminals. If not observed, there will be a risk of electric shock
- Each time work has been carried out (mounting, installation, service work, etc.), check to ensure that wiring is in an orderly state and that the correct terminals of the LMV5... are used and make the safety checks as described in *Commissioning notes*. If not observed, there is a risk of impairment of safety functions and of electric shock hazard
- Make certain that none of the 3 connecting wires of the QRI... is connected to terminal X10-02 pin 3 (mains voltage L)! Risk of damage to QRI... and LMV5...!
- Due to its mounting location behind the baffle plate, the flame detector has high signal sensitivity and, therefore, identifies small variations in infrared radiation as a flame. For this reason, make certain that so-called heat streaks after loss of flame (emitted for example by after-glowing combustion chamber lining) will not reach the detector as these would simulate a flame. Air turbulence or similar may modulate infrared radiation emitted by hot boiler or burner components in a way that a flame will be simulated. Likewise, moving parts in the detector's viewing range can cause infrared radiation from the boiler (or a viewing tube) to be modulated, thereby possibly generating sporadic detector signals. Strong burner or detector vibrations can also produce variations in radiation. For this reason, the burner or boiler manufacturer must make certain that such modulated radiation cannot reach the flame detector. For example, loose cables (moving up and down in the fan's airstream) are not permitted within the detector's viewing range. If this is not observed, there is a risk of loss of safety functions
- Consider carefully the use of infrared flame supervision if several burners use the same combustion chamber (if this is not observed, there is a risk of loss of safety functions). In general, this type of flame supervision is not suited for the specific supervision of individual burners
- Check to ensure that the burner will initiate lockout when – while the burner is running – the flame detector is removed from its fixing on the burner and – without moving it – is exposed to room lighting
- Fall or shock can adversely affect the safety functions. Such units must not be put into operation even if they do not exhibit any damage

Mounting notes

- Ensure that the relevant national safety regulations are complied with
- Secure the flame detector to the burner with the clamp and flange provided. With the clamp's fixing screw loosened, the detector can be correctly adjusted toward the flame. This adjustment can be checked by watching the intensity of the flame signal on the AZL5... display and operating unit of the LMV5... burner control, or with the help of the measuring circuit (see *Detector signal measurement*)
- Ensure that the connection between the metal surface of the flange and the burner's earthed housing is electrically conductive

Locate the detector such that, if possible, only the flickering peripheral range of the flame will be detected. The view at hot boiler walls or other hot boiler or burner components must be restricted as much as possible. This can be attained by clearly confined viewing conditions behind narrow baffle plates. If this is not possible, a viewing tube should be used to restrict the viewing range to a smaller area of the flame. Length, diameter and alignment of the viewing tube must be determined through testing, depending on the size of burner and boiler

The viewing range should be reduced to such an extent that:

- a) the minimum detector output signal required is attained over the burner's entire output range (for details, refer to the Basic Documentation of the LMV5... (P7550)
- b) after loss of flame, the valve's operating voltage is switched off by the burner control as required by the standards (see *Commissioning notes*).

Electrical connection of the flame detectors

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

- Never run the detector cable together with other cables
 - Line capacitance reduces the magnitude of the flame signal
 - Use a separate cable
- Observe the permissible length of the detector cables (see *Technical data*)
- Always run the ignition cable separate while observing the greatest possible distance to other cables (min. 3 cm)
- Test the flame detector on all applications. When used in connection with the LMV5..., the test is to be made with a test routine (for details, see the Basic Documentation P7550)
- Make certain that the detector's cable does not get into contact with hot burner or boiler surfaces
- Use an AC voltmeter ($R_i = 10\text{ M}\Omega$) to ensure that there is no voltage across the reference line (blue wire = N of the LMV5...) and the burner housing (PE)

Commissioning notes

- When commissioning the plant or when doing maintenance work, make the following safety checks:

Safety check	Anticipated response
a) Burner startup with flame detector darkened	Lockout at the end of safety time (TSA)
b) Burner startup with flame detector exposed to extraneous light (e.g. light from an incandescent lamp interrupted at about 20 Hz)	Lockout at the end of the prepurge time
c) Simulation of flame failure during operation. For that purpose, darken the flame detector during operation and maintain this state	Lockout or restart, depending on the burner control's configuration
d) Check the safety time in operation in the event of loss of flame; for that purpose, disconnect manually the fuel valves from power and check the time the burner control requires from this manual disconnection until the valves' power supply is turned off	Burner control disconnects power supply to the valves within the period of time allowed for the relevant plant

- Make a loss-of-flame test with the AZL5... of the LMV5... burner control



Note!
Only in connection with burner controls!



EAC Conformity mark (Eurasian Conformity mark)



ISO 9001:2008
ISO 14001:2004
OHSAS 18001:2007

For use in the U.S. / Canada, the flame detectors carry the    marks.

Service notes

To clean the detector's lens, use a soft, clean cloth (free from oil and solvents).

Disposal notes



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

Mechanical design

The QRI... has an impact-proof housing made of black plastic. The lens is fitted in a dust-tight position.
The QRI... can be secured to the burner within its adjusting range, using the clamp and the flange provided.
The 3-core connecting cable is ready connected to the QRI... and features cable strain relief.
Depending on the type of burner construction, there are flame detectors for frontal or lateral illumination available.

Type summary

Article no.	Type reference	Illumination	Cable length (L)	Cable end	Accessories
BPZ:QRI2A2.B180B	QRI2A2.B180B	Frontal	180 cm	Stripped	---
BPZ:QRI2B2.B180B	QRI2B2.B180B	Lateral	180 cm	Stripped	---
BPZ:QRI2B2.B180B1	QRI2B2.B180B1	Lateral	180 cm	Stripped	4 241 8855 0 Flange with radius and clamp

When ordering, please give the complete type reference according to *Type summary*.



Flange, with radius

4 241 8855 0



Flange, straight

4 241 8898 0



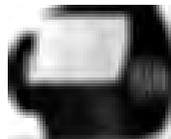
Clamp

4 199 8806 0



Mounting kit for frontal illumination
Consisting of heat insulating piece AGG15 (3/4" 14-NPSM thread), heat insulation glass, adapter sleeve and clamp

AGG2.110



Adapter, protective sleeve Pg9 / 1/2" 14-NPSM thread

AGG2.120



Mounting coupling

AGG04

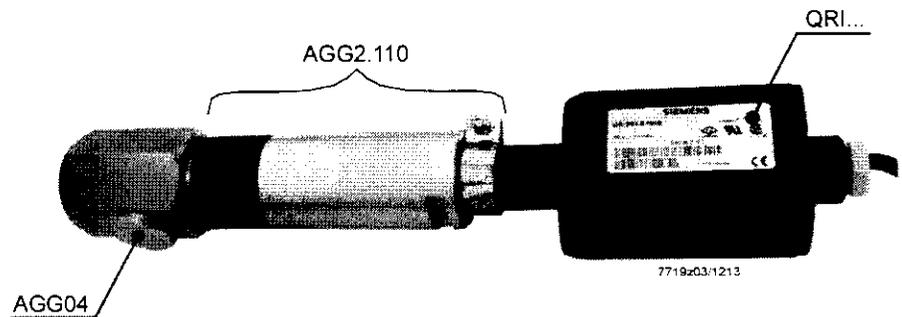
Adapter of 3/4" 14-NPSM thread for a European pipe thread (G1").



Heat insulating piece (spare part)

AGG15

Mounting of the mounting coupling AGG04 and the mounting kit AGG2.110



Technical data

General detector data

Operating voltage	
- Operation	DC 14 V \pm 5%
- Test	DC 21 V \pm 5%
Signal voltage	DC 0...5 V
Length of connecting cable	Max. 180 cm
Degree of protection	IP54
Power consumption	<0.5 W
Length of auxiliary detector cable	Max. 100 m
Safety class	II
Vibrations to IEC 6068-2-6	Max. 1 g / 10...500 Hz
Weight incl. cable 180 cm	Approx. 0.175 kg
Mounting position	Optional

Environmental conditions

Storage	DIN EN 60721-3-1
Climatic conditions	Class 1K3
Mechanical conditions	Class 1M2
Temperature range	-20...+60 °C
Humidity	<95% r.h.
Transport	DIN EN 60721-3-2
Climatic conditions	Class 2K2
Mechanical conditions	Class 2M2
Temperature range	-20...+60 °C
Humidity	<95% r.h.
Operation	DIN EN 60721-3-3
Climatic conditions	Class 3K5
Mechanical conditions	Class 3M2
Temperature range	-20...+60 °C
	short-time (max. 1 min) up to 75 °C
Humidity	<95% r.h.



Attention!

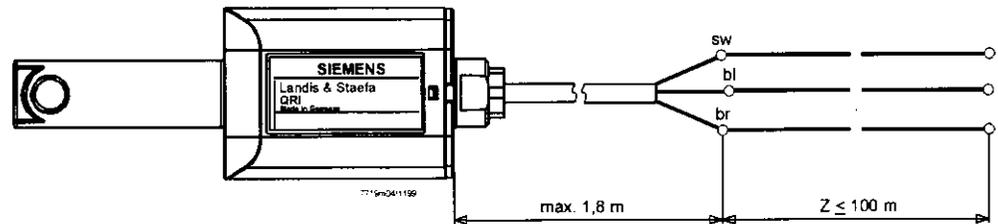
Condensation, formation of ice and ingress of water are not permitted!
If not observed, the safety functions are no longer ensured and there will be a risk of electric shock.

Function

With this type of flame supervision, the changes in infrared radiation are used to generate the flame signal. The flame-detecting element is an infrared-sensitive photoresistor whose spectral sensitivity covers the range of approximately 1...3 μm . The detector does not respond to constant radiation or radiation with mains frequency harmonics (e.g. 50 Hz or multiples thereof). The suppression of these radiation frequencies is made electronically, directly dependent on the current mains frequency at which the relevant burner control (e.g. LMV5...) is operated. As a result, filtering takes place within a very narrow band, which means that the signal generated by the flame can almost completely be utilized since the frequency and the rate of change of infrared radiation constantly change. Hence, the detector's ability to capture the flame's radiation behind the burner's baffle plate is extremely high. As a result of the high level of sensitivity, constant or mains frequency-harmonic extraneous light sources remain undetected only if the detector itself is not moved. Due to its short-wave spectrum, the ignition spark will not be detected. The detector's analog output signal (0... approx. +5 V) is a measure of the changes of the flame's radiation intensity.

Maximum detector cable length

If the connecting cable length of 180 cm is not sufficient, the burner manufacturer can extend it up to a maximum of 100 m (also see *Installation notes*).



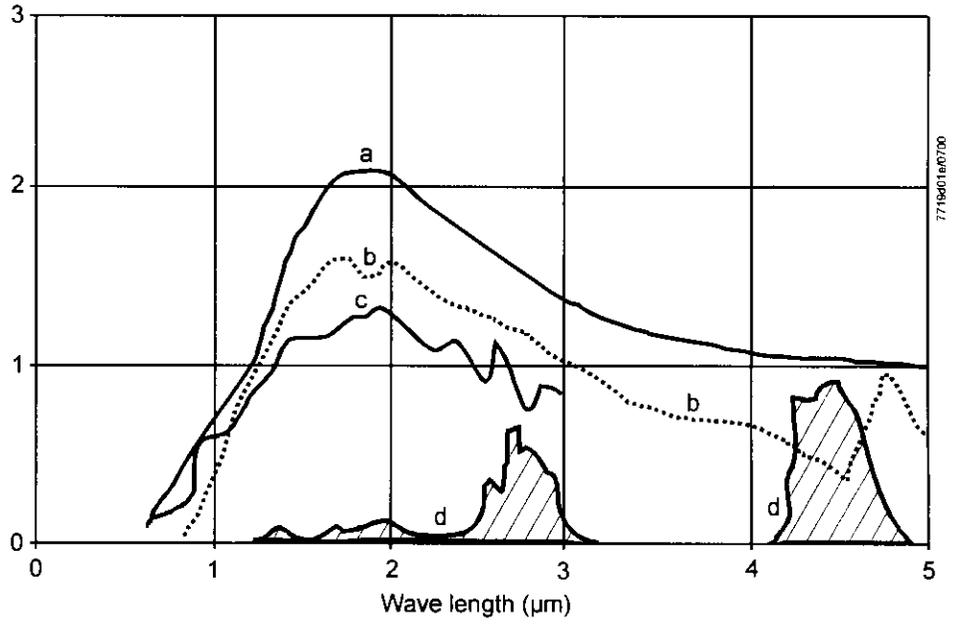
Legend

bl Blue wire = reference line
br Brown wire = power line

sw Black wire = signal line
Z Extension cable

Flames

Relative intensity of radiation

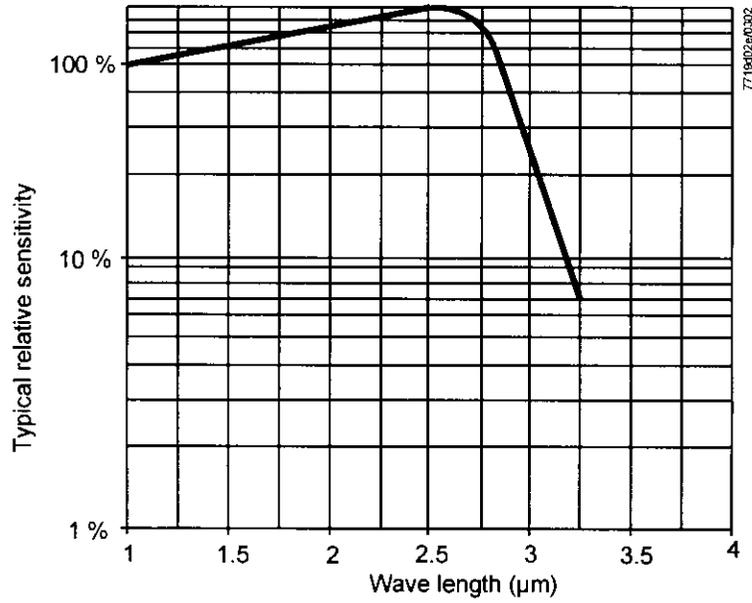


Spectral emission of radiation of luminous and nonluminous flames at 1,500 K (extract from VDI Report no. 423, 1981).

Legend

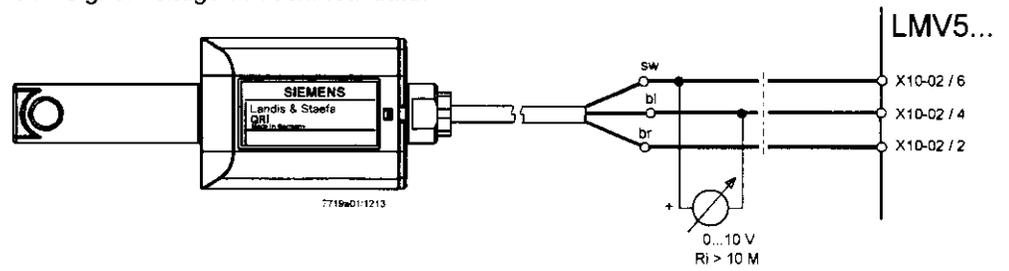
- a Black body radiation
- b Pulverized coal flame
- c Oil flame
- d Gas flame

Sensitivity of flame detector



Measurement of the detector current

See *Signal voltage* in *Technical data*.

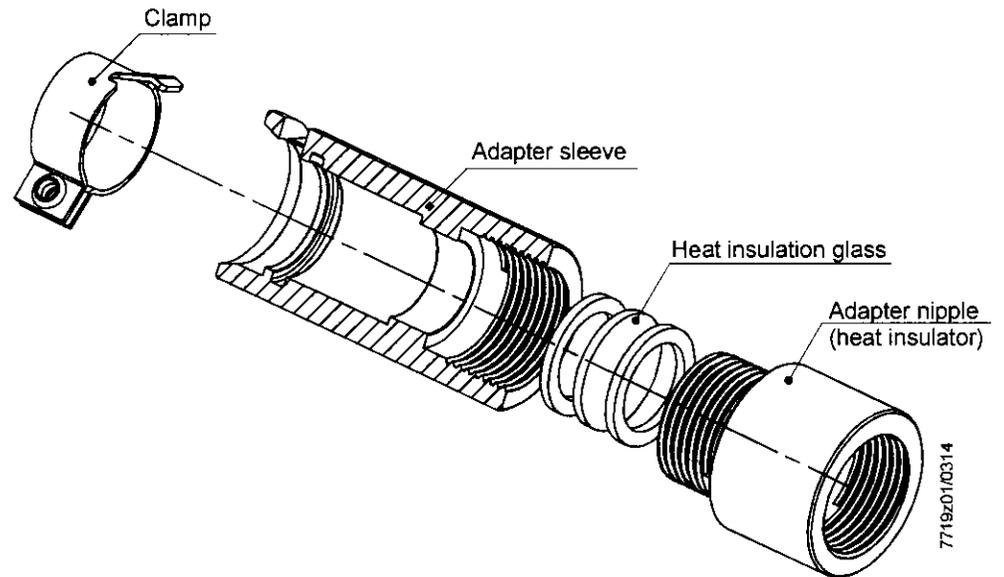


Measurement of the detector's signal with a Voltmeter is not normally required since the flame signal's intensity is shown on the AZL5... display and operating unit.

Drawing of disposition

AGG2.110

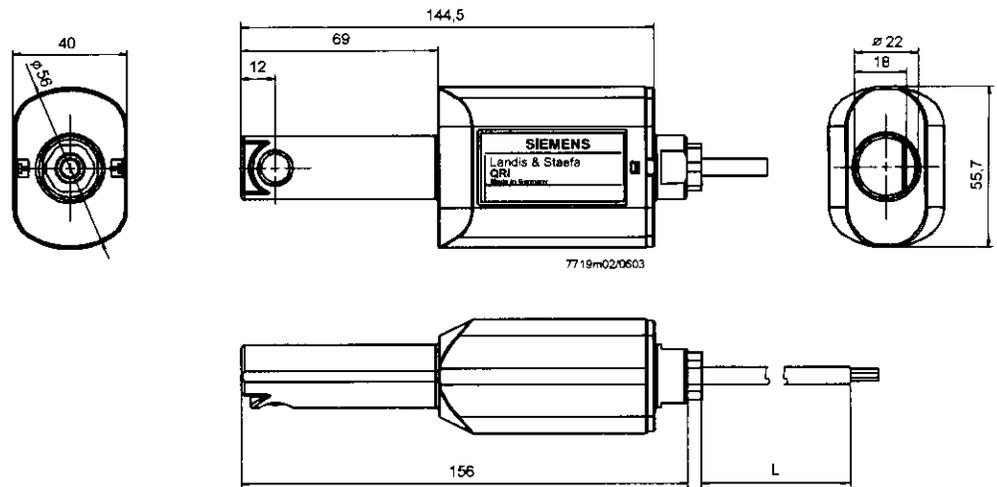
Mounting kit is supplied completely assembled.



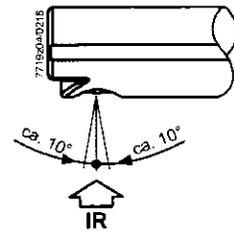
Dimensions

Dimensions in mm

QR12B...
for lateral illumination



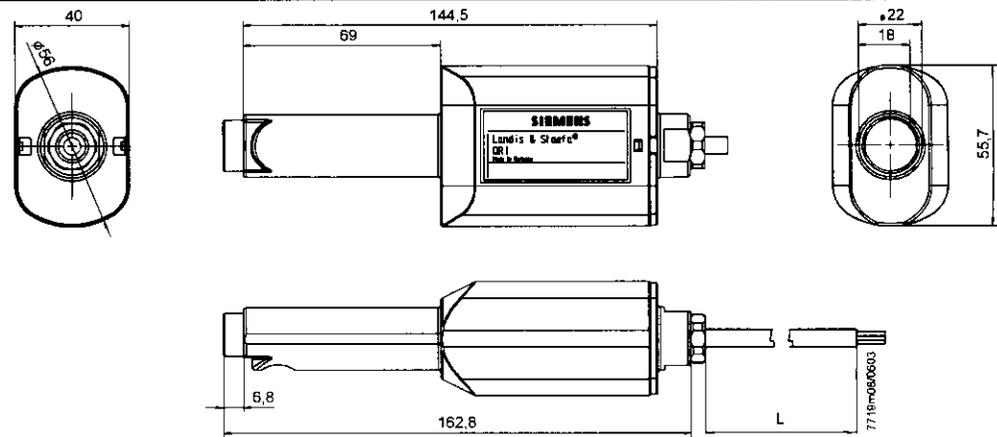
QR12B... viewing angle



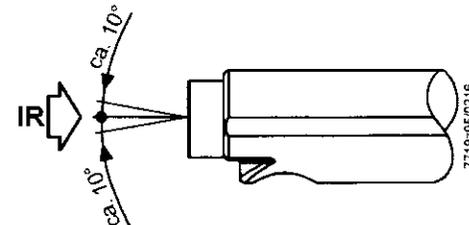
Legend

- IR Infrared rays
- L Available cable length (see *Type summary*)

QR12A...
for frontal illumination



QR12A... viewing angle

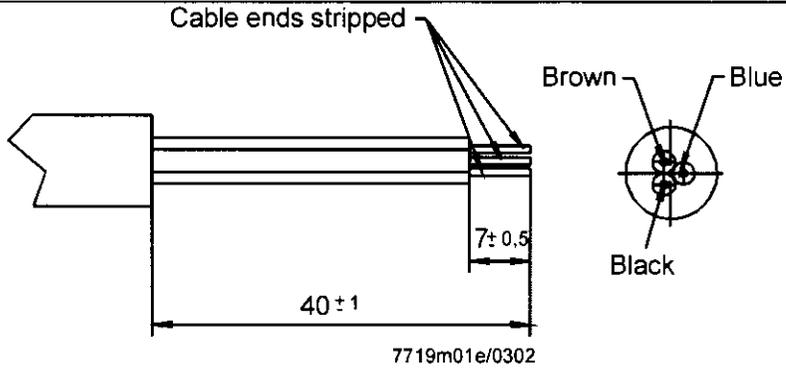


Legend

- IR Infrared rays
- L Available cable length (see *Type summary*)

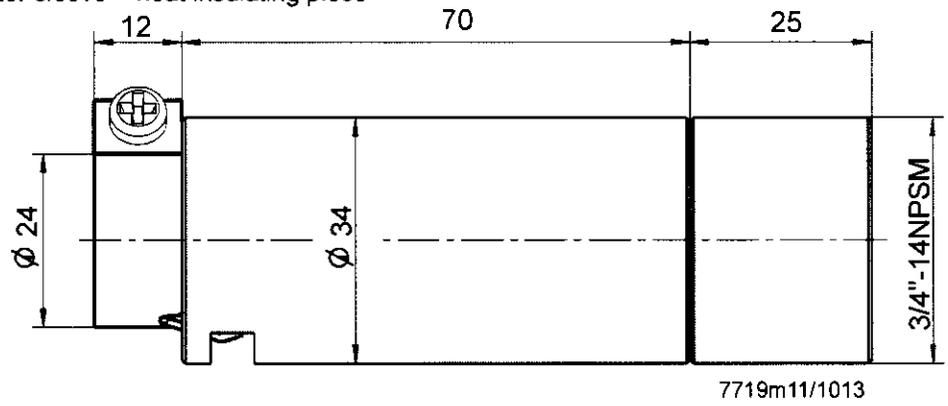
Dimensions (cont'd)

Connecting cable

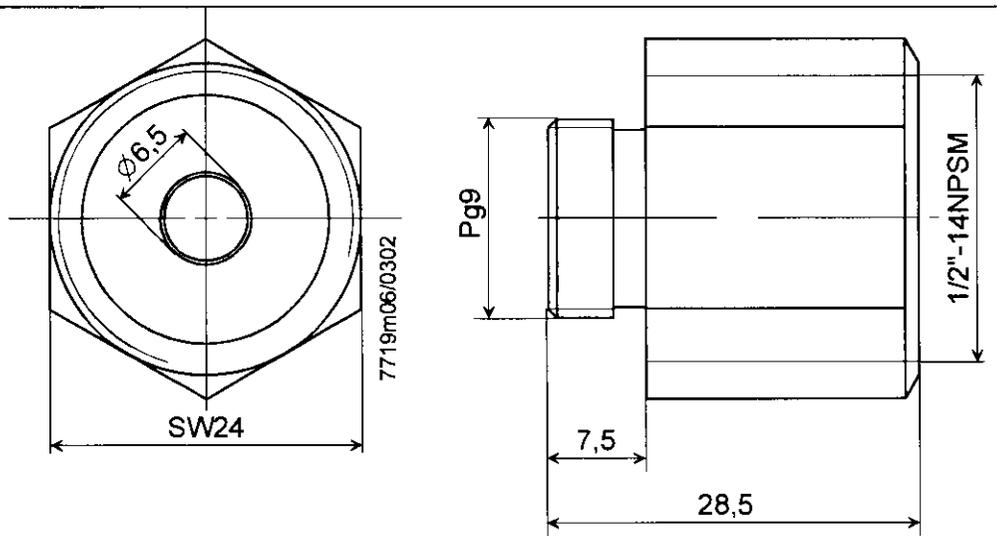


Mounting kit AGG2.110

Clamp (4 199 8806 0) + adapter sleeve + heat insulating piece

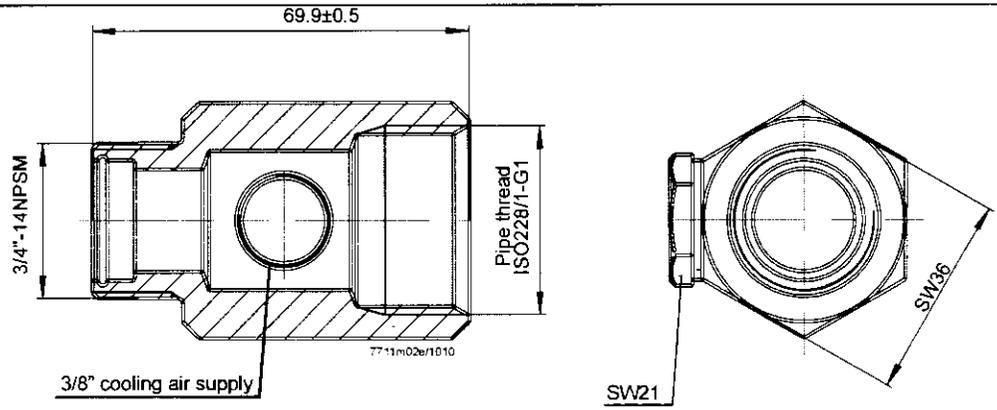


Adapter AGG2.120



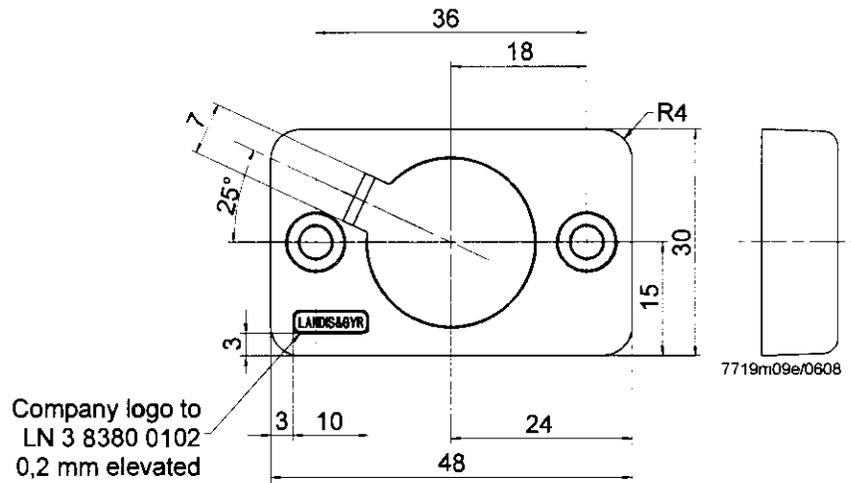
Dimensions (cont'd)

Mounting coupling
AGG04



Flange straight

4 241 8898 0



Flange with radius

4 241 88550

