Manuals+ — User Manuals Simplified.

S Plus S REGELTECHNIK
PREMASGARD 11D9 Modbus

S Plus S REGELTECHNIK PREMASGARD 11D9 Modbus Instruction Manual

Contents

S Plus S REGELTECHNIK PREMASGARD 11D9 Modbus

Specifications:

- Type: WG02
- Model: 11D9 PREMASGARD 11D9-Modbus
- Output: Modbus
- Power Supply: 12V
- Pressure Type: Differential Pressure
- Pressure Connection: M16x1.5
- Measurement Range: 0.01 bar to 1 bar
- Accuracy: ±0.001 bar

Product Usage Instructions

Mounting:
Follow the provided mounting schema (A, B, C, D) in the manual for proper installation.

Setup:
Set the Modbus address using the DIP switches as indicated in the manual.

Calibration:
Perform manual zero point adjustment and offset correction as described in the manual.

Communication Settings:
Configure the baud rate and parity settings using the DIP switches based on your requirements.

Data Read/Write:
Refer to the telegram section in the manual to understand how to read input registers and write data to the device.

FAQ:

- **Q: How do I set the Modbus address?**

  A: Use the DIP switches following the instructions provided in the manual to set the Modbus address.

- **Q: How can I calibrate the device?**

A: Perform manual zero point adjustment and offset correction as detailed in the manual for accurate calibration.

- **Q: What are the communication settings I need to configure?**

  A: Configure baud rate and parity settings using the DIP switches according to your communication requirements.
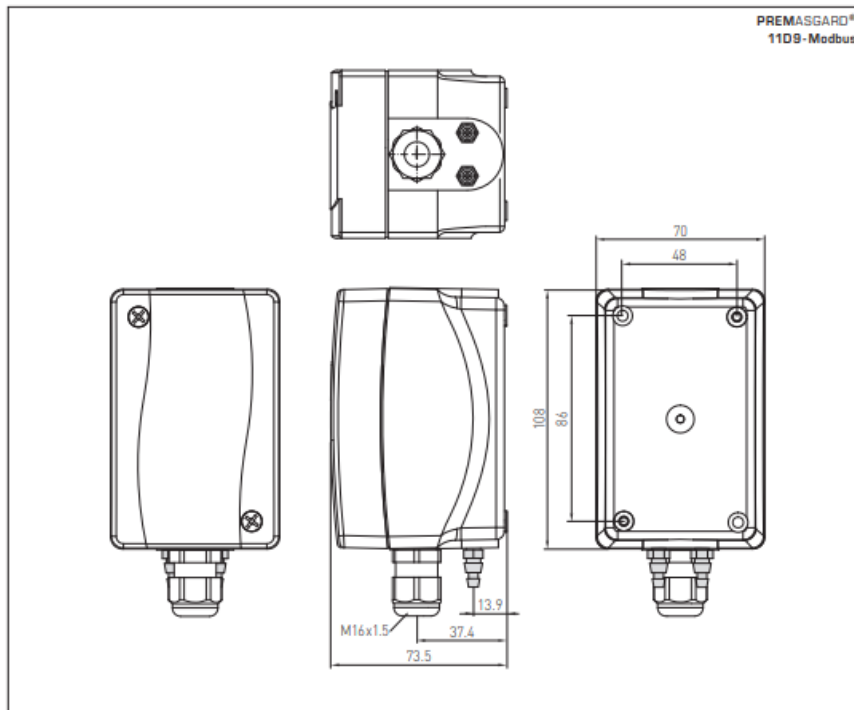
- **Q: How do I read/write data to the device?**

  A: Refer to the telegram section in the manual for instructions on reading input registers and writing data to the device.

Operating and Mounting Instructions

Measuring transducers for pressure, differential pressure and volume flow, incl. connection set, calibratable, with Modbus connection

Dimensional drawing

PREMASGARD® 11D9-Modbus
Maintenance-free microprocessor-controlled PREMASGARD® 11D9 – Modbus with Modbus connection, in an impact-resistant plastic housing, for measuring the differential pressure (max. –500…500 Pa) in the air. Incl. connection set ASD-06 (2 m / 78.74 in connecting hose, two pressure port nipples, screws).

The pressure sensor is applied to measure positive, negative or differential pressure in clean air and gaseous media. It is used in clean-room, Medi-Cal and filter technology, ventilation, and air-conditioning ducts, spray booths, large-scale catering facilities, for filter monitoring and level measurement or for triggering frequency converters.

Innovative Modbus sensor with galvanically separated RS485 Modbus interface, selectable bus termination resistance, DIP switch for setting the bus parameters and bus address in current-free state, LEDs for telegram status display and one a push-in terminal. The sensor is factory-calibrated; an environmental precision adjustment by an expert is possible.

TECHNICAL DATA

TECHNICAL DATA

Power supply:	24V AC (± 20 %) and 15...36 V DC
Power consumption:	< 0.8 W / 24 V DC typically; < 1.0 VA / 24 V AC typically
Data points:	Differential pressure [Pa], Volume flow [m³/h]
Pressure type:	differential pressure
Pressure port:	with metal **nozzle** for pressure hose Ø 6 mm
Measuring range:	**−500... +500 Pa**
Pressure accuracy:	**Type 11D9** (500 Pa): typically ± 3 Pa at +25 °C compared to a calibrated reference unit
Positive / negative pressure:	max. ± 50 kPa
Zero point offset:	± 10 % measuring range
Medium:	clean air and non-aggressive, non-combustible gases
Media-contacting parts:	brass, Ni, Duroplast, Si, epoxy, RTV, BSG, UV silicone gel
Media temperature:	−20...+50 °C (temperature-compensated 0...+50 °C)
Hysteresis:	0.3 % of final value
Linearity:	< ± 1 % of final value
Temp. drift values:	± 0.1 % / °C
Long-term stability:	± 1 % per year
Bus protocol:	Modbus (RTU mode), address range 0...**247** selectable
Signal filtering:	0 s / 1 s / 10 s
Ambient temperature:	−30...+70 °C
Housing:	plastic, UV-resistant, material polyamide, 30 % glass-globe reinforced, colour traffic white (similar to RAL 9016)
Housing dimensions:	108 x 70 x 73.5 mm (Thor 2)
Cable gland:	M 20 x 1.5; including strain relief
Electrical connection:	0.2 - 1.5 mm², via push-in terminal
Protection class:	III (according to EN 60 730)
Protection type:	IP 65 (according to EN 60 529) housing only!
Standards:	CE-conformity, electromagnetic compatibility according to EN 61 326, EMC Directive 2014 / 30 / EU

Measuring range Pressure	Type / WG02	Output	Item no.
± 500 Pa	**Type 11D9**		
−500 ... +500 Pa	PREMASGARD 11D9-Modbus	Modbus	9301-11D4-0910-200SF
ACCESSORIES			
ASD-06	**Connection set** (included in the scope of delivery), consisting of 2 connection nipples (straight) made of ABS, 2 m in PVC hose (soft, UV-resistant) and 4 screws		7100-0060-3000-000

Mounting diagram
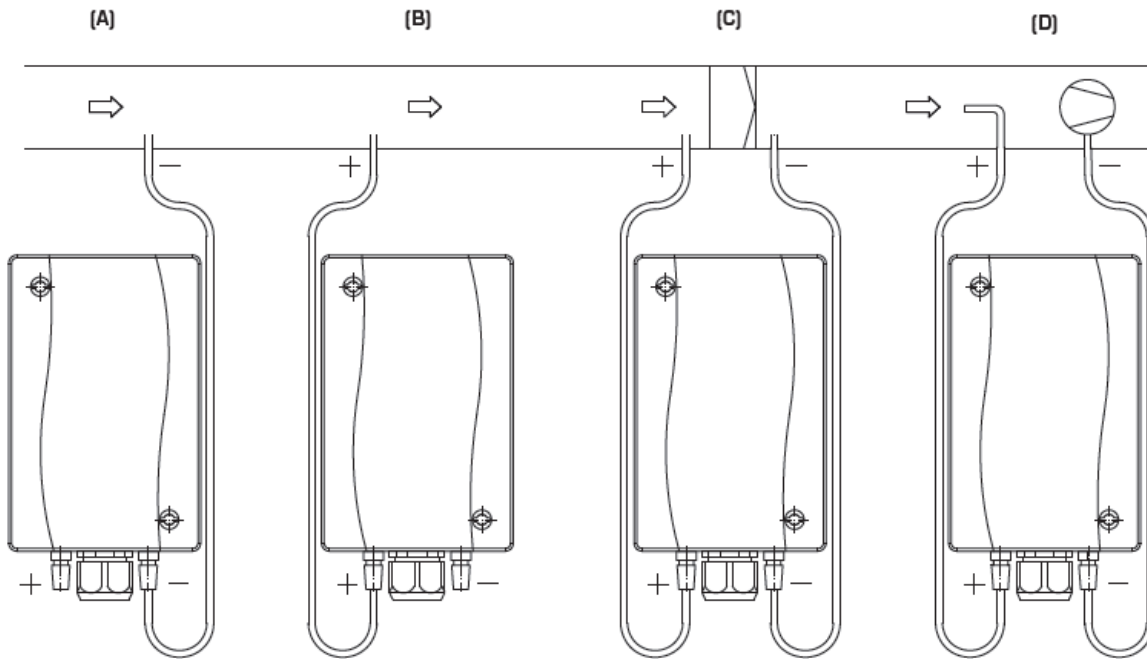
TYPES OF MONITORING

Negative pressure

- P1 (+) is not connected, but open to the atmosphere
- P2 (–) connection inside of duct

Positive pressure

- P1 (+) connection inside of duct
- P2 (–) is not connected, but open to the atmosphere

Filter

- P1 (+) connection upstream of filter
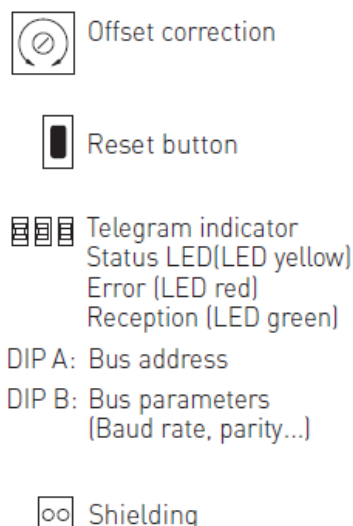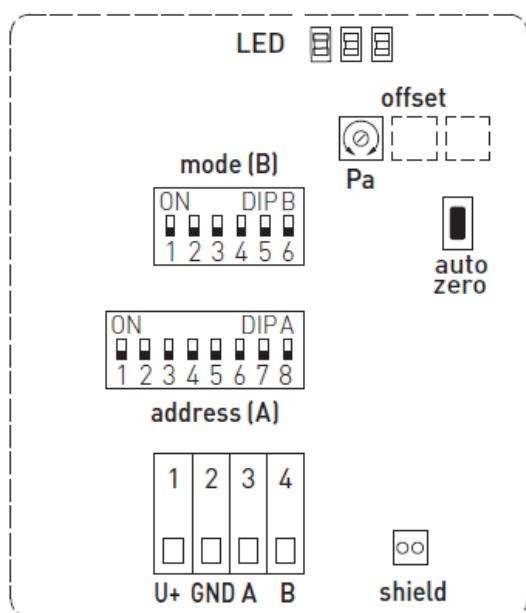- P2 (–) connection downstream of filter

Pressure / volume flow on fan

- P1 (+) connection upstream of fan (vacuum chamber)
- P2 (–) connection of fan nozzle (ring nozzle)

Pressure connections at the pressure-measuring transducer are marked with

- P1 (+) for higher pressure and
- P2 (–) for lower pressure.

Schematic diagram

Manual zero point calibration (Pa):

1. The device must be operative for at least 60 minutes before zero point setting is started.

2. Connect pressure inputs P (+) and P (–) with a hose (differential pressure between the connections = 0 Pa).

3. To set the zero point, press the "auto zero" pushbutton for 10 seconds without interruption.

By pressing the pushbutton, a countdown of approx. 10 seconds is started. The yellow LED is blinking. After the countdown period has elapsed, zero-point calibration takes place. This is indicated by continuous LED light.
Note:
When releasing the pushbutton during countdown, zero point setting is immediately aborted!
**Manual setting of the offset (Pa):**

- The sensors are pre-set and calibrated at the factory.

- Each measuring channel has a separate offset potentiometer for subsequent adjustment of the measurement.

- The adjusting range is ± 10 % of the measuring range (pressure).

Conversion table for pressure values:

Conversion table for	pressure values:				
Unit =	bar	mbar	Pa	kPa	mWs
1 Pa	0.00001 bar	0.01 mbar	1 Pa	0.001 kPa	0.000101971 mWs
1 kPa	0.01 bar	10 mbar	1000 Pa	1 kPa	0.101971 mWs
1 bar	1 bar	1000 mbar	100000 Pa	100 kPa	10.1971 mWs
1 mbar	0.001 bar	1 mbar	100 Pa	0.1 kPa	0.0101971 mWs
1 mWs	0.0980665 bar	98.0665 mbar	9806.65 Pa	9.80665 kPa	1 mWs

BUS ADDRESS

Bus address (binary coded, value selectable from 1 to 247)							
DIP 1	**DIP 2**	**DIP 3**	**DIP 4**	**DIP 5**	**DIP 6**	**DIP 7**	**DIP 8**
128	**64**	**32**	**16**	**8**	**4**	**2**	**1**
O N	**O N**	OFF	OFF	OFF	OFF	OFF	**O N**
Example shows 128 + 64 + 1 = 193 as Modbus address.							
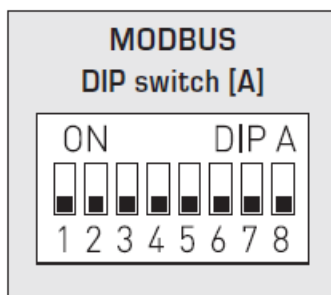
The device address in the range of 1 to 247 is set at DIP switch [A]. For switch positions 1 to 8 see the table on the back!

Address 0 is reserved for broadcast messages. Addresses greater than 247 must not be assigned and are ignored by the device. The DIP switches are binary-coded with the following values:

- DIP 1 = 128…………. DIP 1 = ON
- DIP 2 = 64…………. DIP 2 = ON
- DIP 3 = 32…………. DIP 3 = OFF
- DIP 4 = 16…………. DIP 4 = OFF
- DIP 5 = 8…………. DIP 5 = OFF
- DIP 6 = 4…………. DIP 6 = OFF
- DIP 7 = 2…………. DIP 7 = OFF
- DIP 8 = 1…………. DIP 8 = ON

The switch positions shown here result in the Modbus address 128 + 64 + 1 = 193

BUS PARAMETERS

Baud rate (selectable)	**DIP 1**	**DIP 2**
9600 baud	**O N**	OFF
19200 baud	**O N**	**O N**
38400 baud	OFF	**O N**
reserved	OFF	OFF

MODBUS
DIP switch [B]
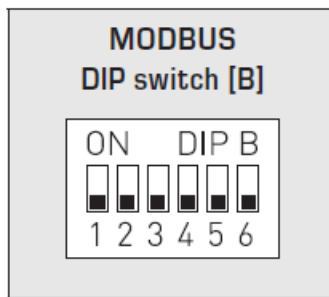
Parity	DIP 3
(selectable)	
EVEN (numbered)	O N
ODD (numbered)	OFF

Parity check	DIP 4
(on / off)	
Active (1 stop bit)	O N
Inactive (no parity) (2 stop bits)	OFF

8N1 mode	DIP 5
(on / off)	
Active	O N
Inactive (default)	OFF

Busabschluss	DIP 6
(ein/aus)	
Active	O N
Inactive	OFF

- The baud rate (speed of transmission) is set at DIP switches 1 and 2 of DIP switch block [B].
- Selectable are 9600 baud, 19200 baud, or 38400 baud – see table!
- Parity is set at DIP switch 3 of DIP switch block [B].
- Selectable are EVEN or ODD – see table!

- Parity check is activated via DIP switch 4 of DIP switch block [B].

- Selectable are active (1 stop bit), or inactive (2 stop bits), i.e. no parity check – see table!

- The 8N1 mode is activated via DIP switch 5 of DIP switch block [B].

- The functionality of DIP switch 3 (parity) and DIP switch 4 (parity check) of DIP switch block [B] is therefore deactivated. Selectable are 8N1 active or inactive (default) – see table !.

- Bus termination is activated via DIP switch 6 of DIP switch block [B].

- Selectable are active (bus termination resistance of 120 Ohm), or inactive (no bus termination) – see table!

COMMUNICATION INDICATOR

Communication is indicated via two LEDs. Error-free received telegrams are signalized by the green LED lighting up, regardless of the device address. Faulty telegrams or triggered Modbus exception telegrams are depicted by the red LED lighting up.

DIAGNOSTICS

An error diagnostic function is integrated

TELEGRAMS

Function 04 Read Input Register

Register	Parameter		Data Type	Value	Range
3×0001	Differential pressure	Without filtering	Signed 16 Bit	− 500…+ 500	− 500…+ 500Pa
3×0002	Differential pressure	Filtering 1 s	Signed 16 Bit	− 500…+ 500	− 500…+ 500Pa
3×0003	Differential pressure	Filtering 10 s	Signed 16 Bit	− 500…+ 500	− 500…+ 500Pa
3×0010	Volume flow (high byte)	Computed value	Unsigned 16 Bit	0…99	Value* 10000 m3/h
3×0011	Volume flow (low byte)	Computed value	Unsigned 16 Bit	0…9999	0…9999 m3/

Function 05 Write Single Coil

Register	Parameter	Data Type	Value	Range
0x0001	Auto zero (Pa)	Bit 0	0 / 1	OFF – ON

Function 06 Write Single Register & Function 16 Write Multiple Register

Register	Parameter (Display)		Data Type	Value	Range
	Physical parameter displayed	Index on display	Unsigned 8 Bit	0…10	0…10

4×0001	**Standard display (cyclic):** Differential pressure [Pa]	–		0	Default setting
	Alternative display (static):				
	Volume flow [m3/h]	1		1	
	Differential pressure [Pa]	6		6	
	Freely configurable display	10		10	
4×0002	7-segment value		Signed 16 Bit	–999…9999	–999…9999
4×0003	14-segment pattern 1 see graphic		Unsigned 16 Bit		see Binary Pattern
4×0004	14-segment pattern 2 see graphic		Unsigned 16 Bit		see Binary Pattern
4×0005	Segment Pattern		Unsigned 16 Bit		see Binary Pattern
4×0006	Dot Matrix Character A		Unsigned 8 Bit	0…255	ASCII character
4×0007	Dot Matrix Character B		Unsigned 8 Bit	0…255	ASCII character
4×0008	Dot Matrix Character C		Unsigned 8 Bit	0…255	ASCII character
4×0009	Dot Matrix Character D		Unsigned 8 Bit	0…255	ASCII character
4×0010	Dot Matrix Character E		Unsigned 8 Bit	0…255	ASCII character
4×0011	Dot Matrix Character F		Unsigned 8 Bit	0…255	ASCII character
4×0012	Dot Matrix Character G		Unsigned 8 Bit	0…255	ASCII character
4×0013	–				
4×0014	–				
4×0015	–				

Register	Parameter	Data Type	Value	Range
4×0023 *	k value	Unsigned 16 Bit	1…2000	1…2000
4×0024	**Function type ****	Unsigned 8 Bit	1…3	1…3

Note* (Register 4×0023)

The computed coefficients for the volume flow display are **not** saved in the permanent memory and are lost at zero voltage. They must be reset when the communication begins.

 Selection of the function type ** (Register 4×0024)

Type 1:

$$V = k \cdot \sqrt{\frac{2 \cdot \Delta p}{\rho}}$$

Rosenberg, Comefri, Gebhardt Nicotra

Type 2:

$$V = k \cdot \sqrt{\Delta p}$$

V = Volume flow [m³/h]

k = k factor

Ziehl-Abegg,

Type 3

$$V = \frac{3600}{k} \cdot \sqrt{\Delta p}$$

Δp = Differential pressure of the static pressures [Pa]

ρ = Air density [kg/m³]

Fläkt Woods

Function 08 Diagnostics
The following sub function codes are supported

| Sub Function Code	Parameter	Data Type	Answer
00	Echo of transmission data (Loopback)		Echo data
01	Restart Modbus (Reset listen-only mode)		Echo telegram
04	Activation listen-only mode		No answer
10	Delete counter		Echo telegram
11	Counter bus telegrams	Unsigned 16 Bit	All valid bus telegrams
12	Counter communication errors (Parity, CRC, frame errors, etc.)	Unsigned 16 Bit	Faulty bus telegrams
13	Counter exception telegrams	Unsigned 16 Bit	Error counter
14	Counter slave telegrams	Unsigned 16 Bit	Slave telegrams
15	Counter telegrams without answer	Unsigned 16 Bit	Broadcast messages (address 0)

Function 17 Report Slave ID

Composition of answer telegram

Byte No.	Parameter	Data Type	Answer
00	Number of bytes	Unsigned 8 Bit	6
01	Slave ID (device type)	Unsigned 8 Bit	23 = **PREMA**SGARD® **11D9 – Modbus**
02	Slave ID (device class)	Unsigned 8 Bit	30 = **PREMA**SGARD® / **PREMA**SREG®
03	Status	Unsigned 8 Bit	255 = RUN, 0 = STOP
04	Version number (release)	Unsigned 8 Bit	1…9
05	Version number (version)	Unsigned 8 Bit	1…99
06	Version number (index)	Unsigned 8 Bit	1

General layout of bus structure

General layout of bus structure

Bus topology with terminating and bias resistors
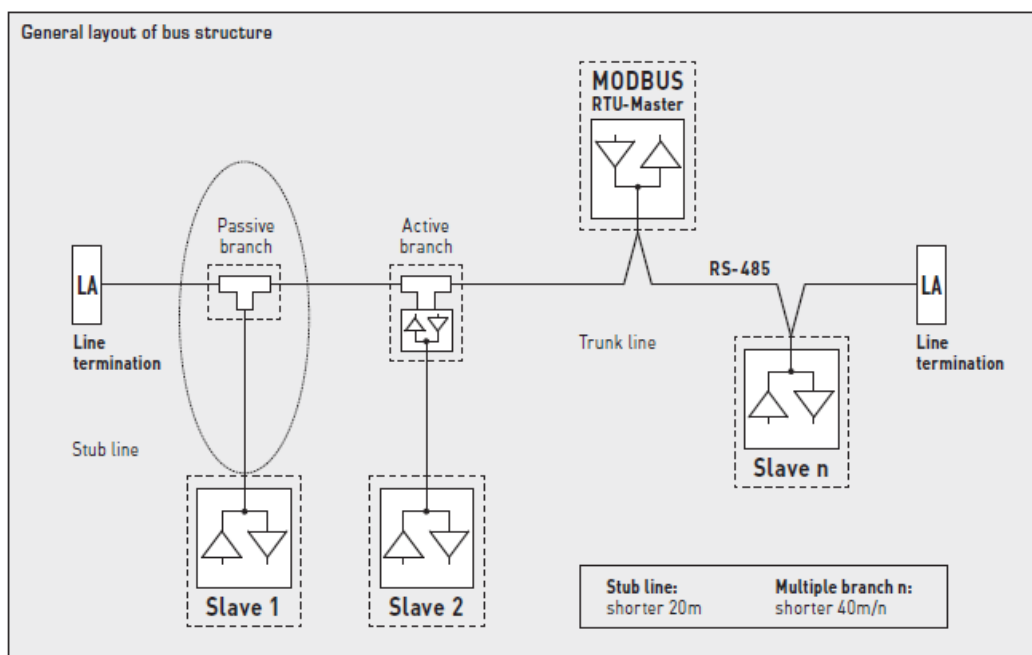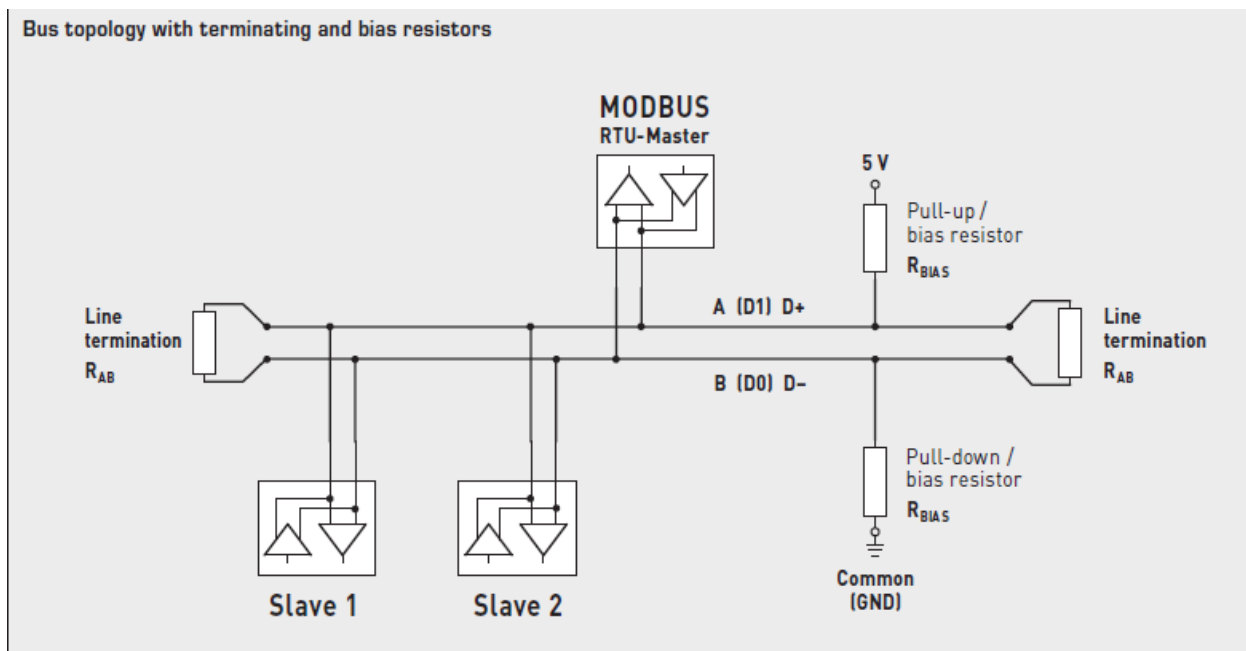
- Terminating resistor may only be installed at the ends of the bus line.
- In networks with repeaters not more than two line terminations are allowed.
- Line termination at the device can be activated via DIP switch 6.
- The bias resistors for bus level definition in the resting state are usually activated at the Modbus master/repeater.
- The maximum number of subscribers per Modbus segment is 32 devices.
- When the number of subscribers is greater, the bus must be subdivided into several segments separated by repeaters. The subscriber address can be set from 1 to 247.
- For the bus line, a twisted-pair cable data line/power supply line and copper mesh wire shield must be used. Therefore, the line capacitance should be less than 100 pF / m (e.g. Profibus cable).

Installation and Commissioning

Notes on installation:
Mounting shall take place while observing all relevant regulations and standards applicable for the place of measurement (e.g. such as welding instructions, etc.). Particularly the following shall be regarded:

- VDE / VDI directive technical temperature measurements, measurement set-up for temperature measurements.
- The EMC directives must be adhered to.
- It is imperative to avoid parallel laying of current-carrying lines.
- We recommend to use shielded cables with the shielding being attached at one side to the DDC / PLC.

Before mounting, make sure that the existing thermometer's technical parameters comply with the actual conditions at the place of utilization, in particular in respect of:

- Measuring range
- Permissible maximum pressure, flow velocity
- Installation length, tube dimensions
- Oscillations, vibrations, shocks are to be avoided (< 0.5 g)

Attention! In any case, please observe the mechanical and thermal load limits of the protective tubes according to DIN 43763 or according to specific S+S standards!

Notes on commissioning:
This device was calibrated, adjusted and tested under standardised conditions. When operating under deviating conditions, we recommend performing an initial manual adjustment on-site during commissioning and subsequently at regular intervals. Commissioning is mandatory and may only be performed by qualified personnel!
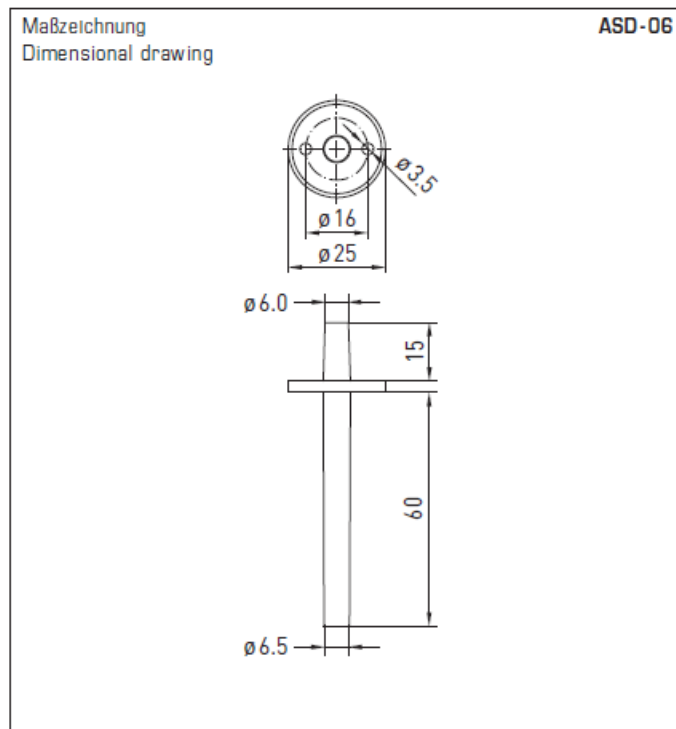
General notes
Our "General Terms and Conditions for Business" together with the "General Conditions for the Supply of Products and Services of the Electrical and Electronics Industry" (ZVEI conditions) including supplementary clause "Extended Retention of Title" apply as the exclusive terms and conditions.

In addition, the following points are to be observed:

- Devices must only be connected to safety extra-low voltage and under dead-voltage condition. To avoid damages and errors at the device (e.g. by voltage induction) shielded cables are to be used, laying parallel with current-carrying lines is to be avoided, and EMC directives are to be observed.
- This device shall only be used for its intended purpose. Respective safety regulations issued by the VDE, the states, their control authorities, the TÜV and the local energy supply company must be observed. The purchaser has to adhere to the building and safety regulations and has to prevent perils of any kind.
- No warranties or liabilities will be assumed for defects and damages arising from improper use of this device.
- Consequential damages caused by a fault in this device are excluded from warranty or liability.
- These devices must be installed and commissioned by authorised specialists.
- The technical data and connecting conditions of the mounting and operating instructions delivered together with the device are exclusively valid. Deviations from the catalogue representation are not explicitly mentioned and are possible in terms of technical progress and continuous improvement of our products.
- In case of any modifications made by the user, all warranty claims are forfeited.
- This device must not be installed close to heat sources (e.g. radiators) or be exposed to their heat flow. Direct sun irradiation or heat irradiation by similar sources (powerful lamps, halogen spotlights) must absolutely be avoided.
- Operating this device close to other devices that do not comply with EMC directives may influence functionality.
- This device must not be used for monitoring applications, which serve the purpose of protecting persons against hazards or injury, or as an EMERGENCY STOP switch for systems or machinery, or for any other similar safety-relevant purposes.
- Dimensions of enclosures or enclosure accessories may show slight tolerances on the specifications provided in these instructions.
- Modifications of these records are not permitted.
- In case of a complaint, only complete devices returned in original packing will be accepted.

These instructions must be read before installation and commissioning and all notes provided therein are to be regarded!

Zubehör

Accessories

Maßzeichnung
Dimensional drawing

ASD-06

ø3.5
ø16
ø25
ø6.0
15
60
ø6.5

ASD – 06
Anschluss-Set Connection set

Bus address, binary coded

Documents / Resources

S Plus S REGELTECHNIK PREMASGARD 11D9 Modbus [pdf] Instruction Manual
PREMASGARD 11D9, PREMASGARD 11D9 Modbus, Modbus

References

- **S+S Regeltechnik | Ihr sensorik Partner**
- **User Manual**