APLISENS

MANUFACTURE OF PRESSURE TRANSMITTERS AND CONTROL INSTRUMENTS

USER'S MANUAL

ADDITION TO DTR.PCE.PRE-28*(ENG)*. DTR.SG…04*(ENG)*

PRESSURE TRANSMITTERS TYPE: PCE-28/MODBUS, PRE-28/MODBUS HYDROSTATIC LEVEL PROBES TYPE: SGE-25.SMART/MODBUS; SGE-25S.SMART/MODBUS

Edition A

WARSAW JULY 2010

Symbols used

Symbol	Description
⚠	Warning to proceed strictly in accordance with the information contained in the documentation in order to ensure the safety and full functionality of the device.
i	Information particularly useful during installation and operation of the device.
🗑	Information on disposal of used equipment

BASIC REQUIREMENTS AND SAFE USE

⚠
- **The manufacturer will not be liable for damage resulting from incorrect installation, failure to maintain the device in a suitable technical condition, or use of the device other than for its intended purpose.**
- Installation should be carried out by qualified staff having the required authorizations to install electrical and pressure-measuring devices. The installer is responsible for performing the installation in accordance with these instructions and with the electromagnetic compatibility and safety regulations and standards applicable to the type of installation.
- The device should be configured appropriately for the purpose for which it is to be used. Incorrect configuration may cause erroneous functioning, leading to damage to the device or an accident.
- In systems with pressure transmitters there exists, in case of leakage, a danger to staff on the side where the medium is under pressure. All safety and protection requirements must be observed during installation, operation and inspections.
- If a device is not functioning correctly, disconnect it and send it for repair to the manufacturer or to a firm authorized by the manufacturer.

⚠
In order to minimize the risk of malfunction and associated risks to staff, the device is not to be installed or used in particularly unfavourable conditions, where the following dangers occur:
- possibility of mechanical impacts, excessive shocks and vibration;
- excessive temperature fluctuation, exposure to direct sunlight;
- condensation of water vapour, dust, icing

The manufacturer reserves the right to make changes (not having a negative impact on the operational and metrological parameters of the products) without updating the contents of the technical manual.

PCE-28/Modus, PRE-28/Modbus - pressure transmitters,
SGE-25. Smart/Modbus, SGE-25S.Smart/Modbus - hydrostatic level probes

1. Introduction

This user's manual is intended for **PCE-28/Modus, PRE-28/Modbus** pressure transmitters and **SGE-25. Smart/Modbus, SGE-25S.Smart/Modbus** hydrostatic level probes with Modbus RTU output signal users and is supplement of user's manual these products appointed: DTR.PCE.PRE-28*(ENG)*, DTR.SG....04*(ENG)*.

Permitted operating conditions, construction materials, pressure connectors, ingress protection rating of case, measurement ranges as for **PCE-28, PRE-28, SGE-25. Smart, SGE-25S.Smart.**

Output signal download, configuration and calibration are made using Modbus RTU protocol. Transmitter configuration and calibration are made using configuration software „RAPORT-Modbus" installed on PC.

2. Technical Data

2.1. PCE-28/Modbus, PRE-28/Modbus - metrological parameters

Accuracy	$\leq$ ±0,1% for the nominal range,
Long term stability	$\leq$ accuracy for 3 years
(for the nominal range)	
Thermal error	< ±0,1% (FSO) / 10℃
	max ±0,4% (FSO) in the whole compensation range
Thermal compensation range	-25...80℃ (other range on request)
Additional electronic damping	0...30 s

2.3. SGE-25.Smart/Modbus, SGE-25S.Smart/Modbus - metrological parameters

Thermal compensation range	0...80℃ (other range on request)
Additional electronic damping	0...30 s
Other parameters as for SGE-25. Smart, SGE-25S.Smart.	

2.4. PCE-28/Modbus, PRE-28/Modbus, SGE-25.Smart/Modbus - electrical parameters

Power supply	6...28 V DC
Output signal	MODBUS RTU
Transmission range	1200 m
Address space	1...247 devices address
Max. quantity of devices on highway	256
Transmission speed	600, 1200, 2400, 4800, 9600, 19200, 28800, 38400, 57600, 115200 bps
Parity transmission	no parity, odd, even
Frame transmission	10...11 bits (1, 2 bit-stop)

Possibility of setting of response time in „RAPORT-Modbus" program — 50 ms $\div$ 2600 ms.
Implementation of broadcast mode (address 0). Response data frame.

2.5. Data in frame transmission.

40001	0x0000	**User's value**	Value 0	IEEE754	----
40003	0x0002	**Pressure of sensor 1**	Pressure from sensor module	IEEE754	Setting unit
40005	0x0004	**Pressure of sensor 2**	Value 0	IEEE754	Setting unit
40007	0x0006	**Temperature**	Temperature from sensor module	IEEE754	ºC
40009	0x0008	**Temperature of sensor 1**	Ambient temperature	IEEE754	ºC
40011	0x000A	**Temperature of sensor 2**	Value 0	IEEE754	ºC
40013	0x000C	------------------------	-----------------------	-----------------------	-------------------
40015	0x000E	------------------------	-----------------------	-----------------------	-------------------
40017	0x0010	**User's value**	Value 0	Signed 16-bit int	----
40018	0x0011	**Pressure of sensor 1**	Pressure from sensor module	Signed 16-bit int	1/100 Setting unit
40019	0x0012	**Pressure of sensor 2**	Value 0	Signed 16-bit int	1/100 Setting unit
40020	0x0013	**Temperature**	Temperature from sensor module	Signed 16-bit int	1/100 ºC
40021	0x0014	**Temperature of sensor 1**	Ambient temperature	Signed 16-bit int	1/100 ºC
40022	0x0015	**Temperature of sensor 2**	Value 0	Signed 16-bit int	1/100 ºC
40023	0x0016	**Unit of pressure**	Unit of pressure	16-bit int	See table 2.5.1.
40024	0x0017	------------------------	-----------------------	-----------------------	-------------------
40025	0x0018	**Upper range of sensor**	Reading value	IEEE754	Unit of pressure
40027	0x001A	**Lower range of sensor**	Reading value	IEEE754	Unit of pressure
40029	0x001C	**Time constant of damping**	Reading value.	IEEE754	Second [s]
40031	0x001E	**Lag of response**	Reading value.	16-bit int	Millisecond [ms]
40032	0x001F	**Address Modbus**	Reading value.	16-bit int	2 bytes
40033	0x0020	**Identification register**	Reading value.	16-bit int	6 bytes
40036	0x0024	**Status register**	Reading value.	16-bit int	2 bytes

2.5.1. Codes of pressure units

Unit	Value	Unit	Value
atm	14	mbar	8
bar	7	mmH2O w 4℃	239
FtH2O	3	mmH2O	4
g/cm²	9	mmHg	5
InH2O w 4℃	238	MPa	237
InHg	1	Pa	11
kg/cm²	2	psi	6
kpa	10	torr	13
mbar	12		

2.6. Description of the Modbus status register.

15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0
0	0	Mode broadcast frame 0	Error CRC	0	0	0	Setting lag	0	PV over limit	Another variables over limit	0	0	0	0	0

2.7. Error codes supported by the Modbus.

Error code	Name	Description
1	Inadmissible functional code	Occurs, when the code is not functionally supported by the device and it is not implemented. Currently implemented only function code number 3, that is, Read Holding Registers
2	Inadmissible data address	Occurs, for addresses outside the 4001 – 40037 Data range begins form some address e.g 40001 and ends on address 40037.
3	Incorrect data quantity	Invalid number of registers to read declared in a frame.
4	Emergency of transmitter	Data can not be read.
8	Memory error	RAM or FLASH

3. The way of transmitters connection

Signal	Function	PC(R)E-28	SGE-25.(S.)Smart
		Connector PM12	Cable
Power supply	GND	3	black
	+Vcc	4	red
Digital	RS-485A	2	blue
	RS-485B	1	yellow
Shield	-	-	green

Attention:
- Pressure transmitter (level probe) performing the measurement function only in Modbus mode. After configuration and before leaving program Raport –Modbus, always has to be set in Modbus mode.
- Measuring range for 1/100 full units with sign falls in range from -32767 to 32767 units. Exceeded the measuring range causes the bias reading.
  Property exists for units: g/cm², mbar, mmH2O w 4°C, mmH2O, mmHg, Pa, torr.
- With all transmission speeds (especially at a speed of 115,200 bps) should be used 120 Ώ resistor matching between the A and B outputs „Digital".

3,1. To transmitters cables connecting in MODBUS RTU net is comfortable to use special fitting boxes. Aplisens proposes own boxes designated PP-Modbus.

4. An example of Modbus RTU transmitters net connecting.