OPERATING MANUAL

HD404 series

Low pressure transmitters

EN

V2.0

senseca

Contents

1 Introduction

The **HD404…** series consists of transmitters of relative pressure with reference to the atmosphere or differential pressure in the range:

- from 50 to 1000 Pa (from 0.2" H_2O to 4" H_2O) for the versions with analog output
- 250 Pa / 1000 Pa / 100 mbar for the versions with RS485 Modbus RTU output

The pressure sensor is temperature compensated and has an excellent linearity, repeatability and stability over time.

Available outputs, depending on the model:

- RS485 Modbus–RTU digital output (HD404**S**T…)
- 0...10 V voltage analog output (HD404T…)
- 4...20 mA active current analog output (HD404T…)

In the models with analog output it is possible to choose, via a dip switch, between two measurement ranges in order to select the optimal scale for each application.

An optional auto-zero circuit (**AZ**) periodically equalizes the differential pressure at the sensor input and corrects the offset; the transmitters equipped with this circuit are insensitive to the mounting position. In addition, the auto zero circuit compensates the sensor aging and deviation of the zero with temperature changes, eliminating the maintenance.

The display option (**L**) is available, in which the pressure is visualized on a 4-digit display in the chosen measurement unit.

The "square root" version (**SR**) is especially useful if the transmitter is connected to a Pitot or Darcy tube, as the output is directly proportional to the speed of airflow. The SR version with L option also allows displaying, in addition to the pressure measured, the calculated airflow speed. It is possible to set the coefficient of the Pitot or Darcy tube used and the parameters for the calculation of the speed (air flow temperature, barometric pressure, differential static pressure in the duct). In the models with analog output it is possible to set the full scale speed for the output.

The instruments are factory calibrated and ready for use.

Models with analog output

HD404T

				"" = pressure output **SR =** speed output (only **G** versions)
			"" = without LCD **L** = with LCD	
		"" = without auto-zero circuit (only HD404T3… and HD404T4…) **AZ** = with auto-zero circuit		
	D = differential pressure –f.s.…+f.s. **G =** relative pressure with respect to the atmosphere 0…+f.s.			
1P = range ±100 Pa **2P** = range ±250 Pa **3P** = range ±500 Pa **4P** = range ±1000 Pa	**1M** = range ±10 mmH_2O **2M** = range ±25 mmH_2O **3M** = range ±50 mmH_2O **4M** = range ±100 mmH_2O	**1I** = range ±0,4" H_2O **2I** = range ±0,8" H_2O **3I** = range ±2" H_2O **4I** = range ±4" H_2O		

Models with RS485 Modbus-RTU output

HD404ST

			"" = pressure measurement **SR =** pressure and speed measurement
		"" = without LCD **L** = with LCD	
	"" = without auto-zero circuit (only HD404ST4… and HD404ST5…) **AZ** = with auto-zero circuit		
2 = range ±250 Pa **4** = range ±1000 Pa **5** = range ±100 mbar			

2 Technical specifications

Sensor	Piezoresistive
Measuring range	See tables 2.1 and 2.2
Resolution	**HD404TxP…**: 0.5 Pa (f.s. ≤ 500 Pa) / 1 Pa **HD404TxM…**: 0.05 mmH_2O (f.s. ≤ 50 mmH_2O) / 0.1 mmH_2O **HD404TxI…**: 0.002" H_2O **HD404ST2…**: 0.1 Pa **HD404ST4…**: 1 Pa **HD404ST5…**: 0.1 mbar **HD404…SR**: 0.01 m/s
Accuracy	See table 2.1
Long-term stability	See table 2.1
Overpressure limit	50 kPa
Output	**HD404T…**: 0…10 Vdc or active 4…20 mA **HD404ST…**: RS485 Modbus-RTU
Power supply	**HD404Tx**: 24 Vac ± 10% or 18…40 Vdc **HD404STx**: 12…30 Vdc
Absorption	**HD404Tx**: < 1 W @ 24 Vdc **HD404STx**: < 100 mW @ 12 Vdc
Electrical connections	Screw terminal block, max 1.5 mm^2 , PG9 cable gland
Connection to PC	RS232 serial port (except HD404STx) RS485 serial port (only HD404STx) Can be connected to a USB port by using the optional CP27 (except HD404STx) or RS48 (only HD404STx) adapter
Response time	**HD404T… with dip-switch set to FAST**: 0.125 s in pressure mode 1 s in speed mode (only SR versions) **HD404T… with dip-switch set to LOW**: Configurable 1, 2 or 4 s (default 2 s) **HD404ST…**: Configurable 0.125, 1, 2 or 4 s (default 2 s)
Zero calibration	Automatic for the versions with AZ option
Pressure connections	Ø 6 mm
Compatible media	Only air and non-aggressive dry gases
Operating conditions	-10...+60 °C (-5…+50 °C for the models with AZ option), 0…95 %RH
Storage temperature	-20...+70 °C
Materials	Housing: ABS Pressure connections: nickel-plated brass
Protection degree	IP65

TAB. 2.1: pressure measuring ranges, accuracy and long term stability

MODEL	MEASURING RANGE		ACCURACY (1) (@ 0…+50 °C)		LONG-TERM STABILITY (2)	
	LOW	HIGH	AZ	NO AZ	AZ	NO AZ
MODELS WITH ANALOG OUTPUT (HD404T…)						
Pa (HD404Tx**P**…)						
HD404T1PGAZ…	0…50	0…100	±(0.8% measure + 0.5)	-	≤±0.2	-
HD404T2PGAZ…	0…100	0…250				
HD404T3PG…	0…250	0…500		±1% f.s. nom.		≤±8
HD404T4PG…	0…500	0…1000				
HD404T1PDAZ…	±50	±100		-		-
HD404T2PDAZ…	±100	±250				
HD404T3PD…	±250	±500		±1% f.s. nom.		≤±8
HD404T4PD…	±500	±1000				
mmH$_2$O (HD404Tx**M**…)						
HD404T1MGAZ…	0…5	0…10	±(0.8% measure + 0.05)	-	≤±0.02	-
HD404T2MGAZ…	0…10	0…25				
HD404T3MG…	0…25	0…50		±1% f.s. nom.		≤±0.8
HD404T4MG…	0…50	0…100				
HD404T1MDAZ…	±5	±10		-		-
HD404T2MDAZ…	±10	±25				
HD404T3MD…	±25	±50		±1% f.s. nom.		≤±0.8
HD404T4MD…	±50	±100				
inchH$_2$O (HD404Tx**I**…)						
HD404T1IGAZ…	0…0.2	0…0.4	±(0.8% measure + 0.002)	-	≤±0.0008	-
HD404T2IGAZ…	0…0.4	0…1				
HD404T3IG…	0…1	0…2		±1% f.s. nom.		≤±0.04
HD404T4IG…	0…2	0…4				
HD404T1IDAZ…	±0.2	±0.4		-		-
HD404T2IDAZ…	±0.4	±1				
HD404T3ID…	±1	±2		±1% f.s. nom.		≤±0.04
HD404T4ID…	±2	±4				
MODELS WITH RS485 MODBUS-RTU OUTPUT (HD404**S**T…)						
HD404ST2AZ…	±250 Pa		±(0.8% measure + 0.5) Pa		≤±0.2 Pa	
HD404ST4…	±1000 Pa			±1% f.s.		≤±8 Pa
HD404ST5…	±100 mbar		±(0.8% measure + 0.005) mbar	±1% f.s.	≤±0.002 mbar	≤±0.08 mbar

(1) f.s. nom. (nominal) = full scale of "HIGH" measuring range.

(2) Long-term stability refers to 1 year.

TAB.2.2: Speed full scale in the models with SR option

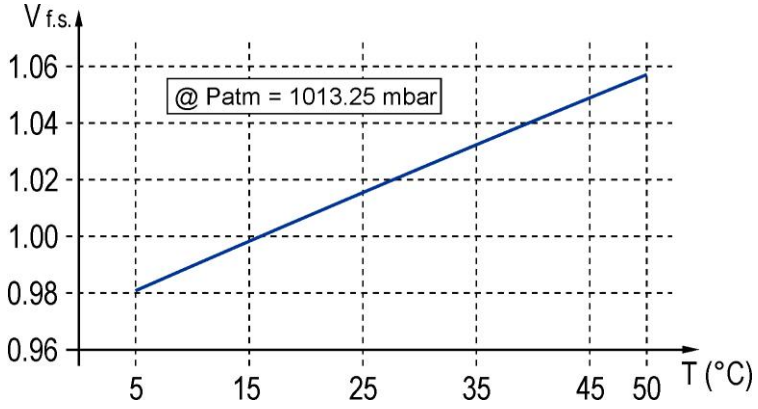
MODEL	MAX SPEED MEASURABLE [3] (m/s)		ANALOG OUTPUT DEFAULT FULL SCALE (m/s)
	LOW	HIGH	
HD404Tx**P**…SR			
HD404T1PGAZ…SR	9.06	12.82	10
HD404T2PGAZ…SR	12.82	20.27	20
HD404T3PG…SR	20.27	28.67	25
HD404T4PG…SR	28.67	40.55	40
HD404Tx**M**…SR			
HD404T1MGAZ…SR	8.98	12.70	10
HD404T2MGAZ…SR	12.70	20.08	20
HD404T3MG…SR	20.08	28.39	25
HD404T4MG…SR	28.39	40.16	40
HD404Tx**I**…SR			
HD404T1IGAZ…SR	9.05	12.80	10
HD404T2IGAZ…SR	12.80	20.24	20
HD404T3IG…SR	20.24	28.62	25
HD404T4IG…SR	28.62	40.48	40

[3] The maximum speed measurable depends on various parameters. Table 2.2 shows the maximum speed measurable with the factory default values:

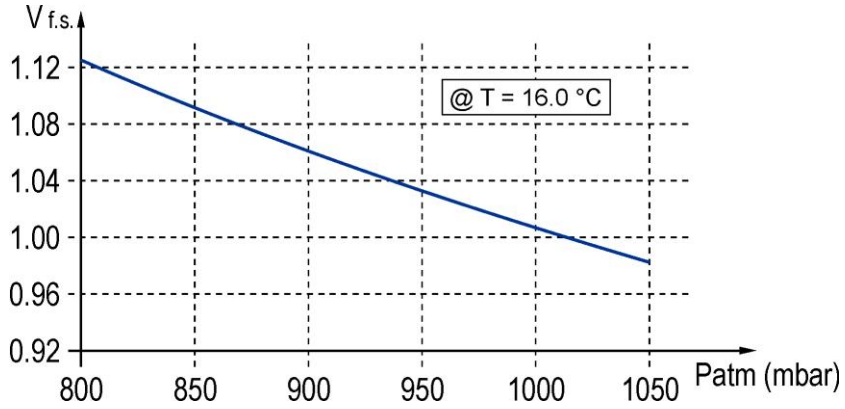
- **K = 1.0** → Tube coefficient
- **T = 16.0 °C** → Air flow temperature
- **Patm = 1013.25 mbar** → Barometric pressure
- **Ps = 0** → Differential static pressure, equal to the difference between the absolute static pressure inside the duct and the barometric pressure. Ps is zero if the duct is open (in contact with the atmosphere); Ps can be different from zero if the duct is closed.

In the models HD404T…, the serial command SV provides the maximum speed measurable as a function of the parameters setting, while the command CS allows setting the full scale speed of the analog output.

The following graphs show the change of the maximum measurable speed value (normalized to 1 for T=16.0 °C and Patm=1013.25 mbar) with the change of the temperature and barometric pressure.

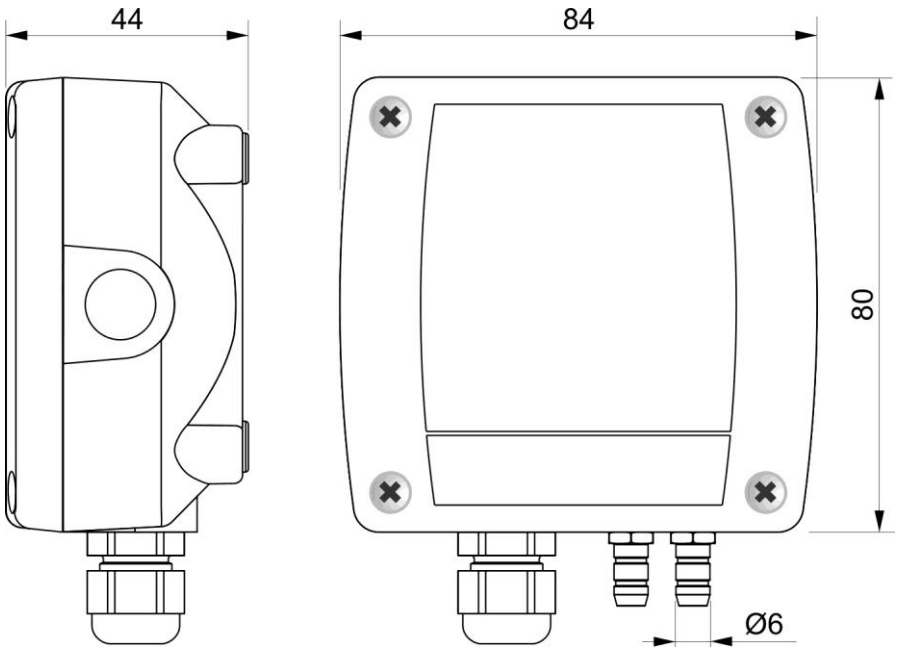


Change of the max. speed with the temperature at constant barometric pressure



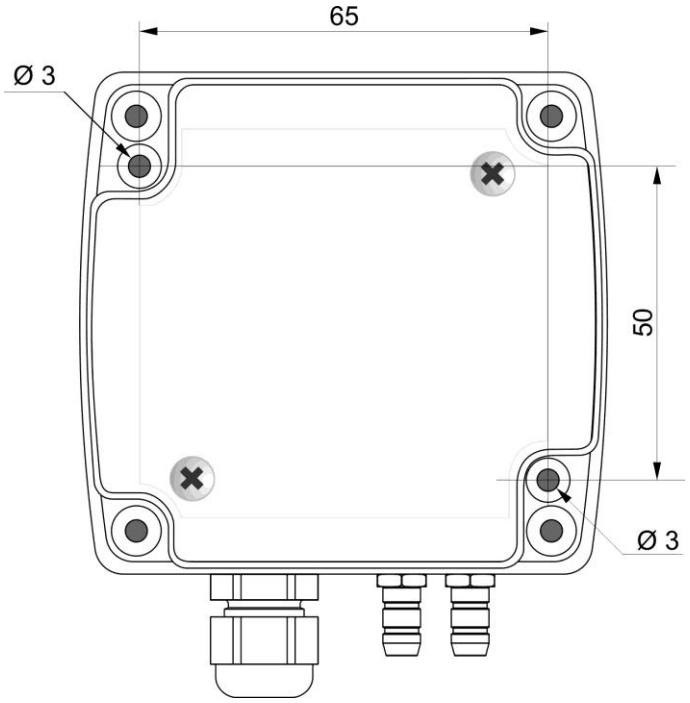
Change of the max. speed with the barometric pressure at constant temperature

Dimensions



3 Installation

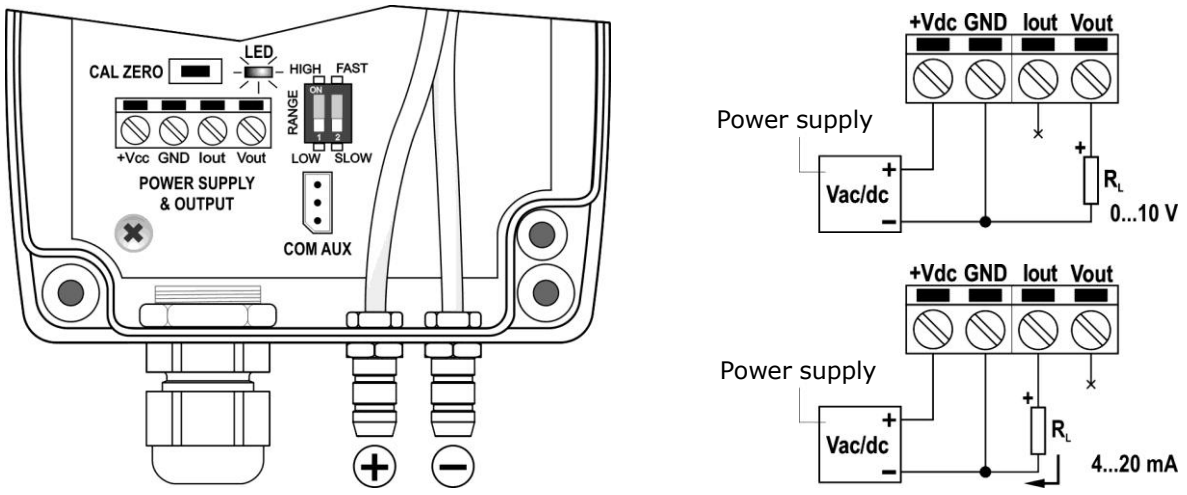
The transmitter is wall-mounted using the two ∅3 mm holes on the back (open the cover to access the holes and the terminal header for electrical connections).



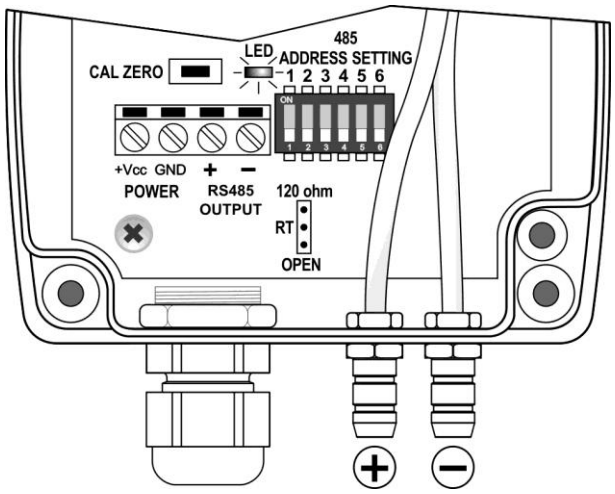
The transmitter can be mounted in any position, but typically it is fixed on a vertical wall with the pressure inputs facing down.

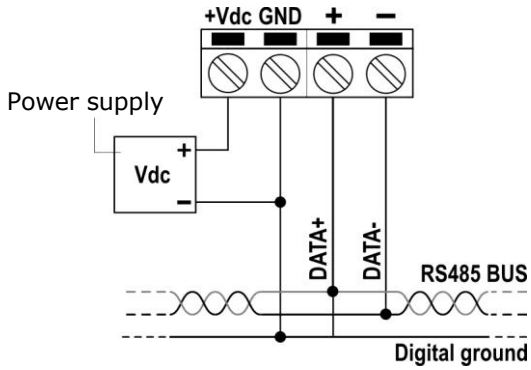
3.1 Electrical connections

Internally there are the terminal header for connecting the power supply and the output and the RS232 serial connector (COM AUX, except HD404ST…).



Models with 0…10 V or active 0/4…20 mA analog output (HD404T…)





Models with digital RS485 output (HD402STx)

Analog outputs:
The load resistance R_L varies according to the type of analog output:

Analog output	Load resistance
0…10 V	> 10 kΩ
4…20 mA	< 500 Ω

In the event of an anomaly in the measurement (detected measurement outside the measuring range), the output goes to a value 10% higher than the full scale: 11 V if the output is 0...10 V, 22 mA if the output is 4…20 mA.

RS485 output:
The output is not isolated. Before connecting the transmitter to the RS485 network, set the address and the communication parameters, if different from the factory preset (see "Configuration" chapter).

The instrument has a built-in line termination that can be connected or removed through the **RT** short jumper placed at the bottom of the electronic board. If the instrument is the last or the first device of a network group, connect the termination by placing the short jumper on the "120 ohm" side. If the instrument is not at the end of a network group, disconnect the termination by placing the short jumper on the side "OPEN".

3.2 Zero calibration

The deviation of the zero due to the mounting position can be corrected by using the CAL ZERO button. In the models with AZ option, an auto-zero circuit periodically automatically equalizes the differential pressure at the input of the sensor and corrects the offset due to the mounting position or sensor aging.

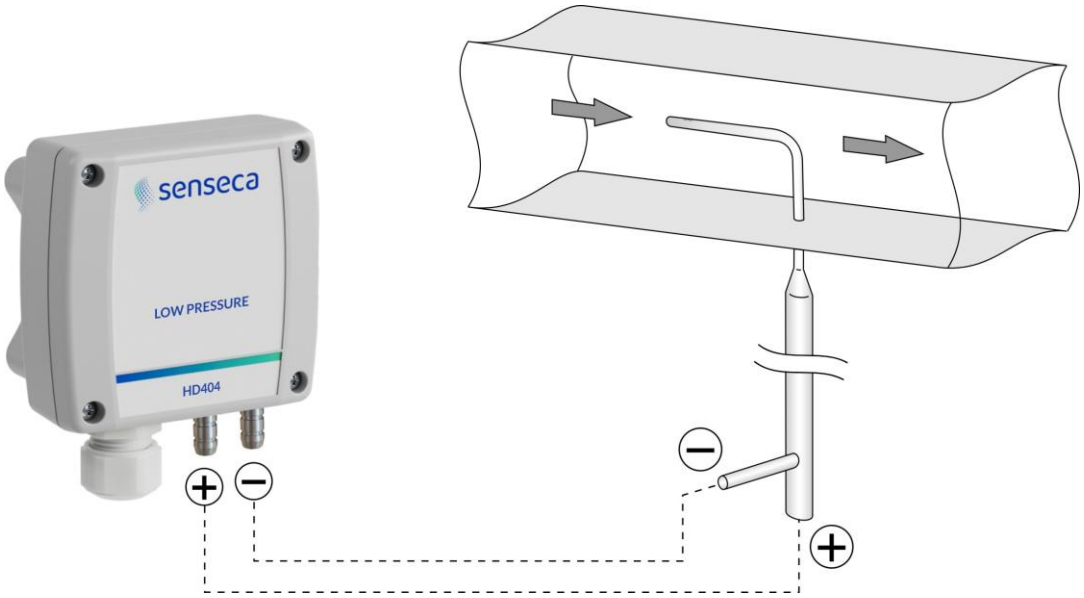
To manually calibrate the zero, disconnect both the tubes from the + and – pressure inputs, then proceed as follows:

- Press CAL ZERO until the red LED starts flashing.
- When the red LED turns off, the zeroing procedure is completed: reconnect the tubes to the pressure inputs.

In the models without AZ option, it is recommended to follow the auto zero procedure at least once a year under normal operating conditions.

In models with AZ option, the zeroing is performed hourly. During the zeroing, which takes about 4 seconds, the output and the display remain frozen at the last measured value.

3.3 Example of connection to a Pitot tube



Transmitter with SR option connected to a Pitot tube

4 Configuration

4.1 Configuration of the models with analog output (HD404T…)

The transmitter can be configured by using the **dip switches** on the circuit board and via the serial communication port **COM AUX**.

Configuration via dip switches:

Dip switches **RANGE**: selection of the LOW or HIGH range for the analog output.

Dip switches **FAST/SLOW**: selection of the response time for the analog output. In FAST mode the response time is 0.125 s in pressure measurement mode and about 1 s in speed measurement mode, while in SLOW mode the response time is selectable to 1, 2 or 4 s by means of the S1, S2 or S4 serial commands respectively. SLOW mode is recommended if there are conditions of turbulence or disruption of air flow.

Serial commands (COM AUX port):

In order to modify the settings, please proceed as follows:

- Connect the COM AUX serial port to a PC USB port via the **CP27** cable. To use the CP27 cable, install the relevant USB drivers on your PC.
- On the PC, launch a standard serial communication software and set the baud rate to 115200, the communication parameters to 8N1 and the COM port number to which the instrument is connected.
- To change the display configuration or the operating mode (commands O3E, O3D, O4E, O4D, O5E, O5D, O6E, O6D, O7E, O7D, O8E, O8D) it is necessary to send the **CAL START** command. It is not necessary to send the CAL START command to change the parameters related to the speed measurement (tube coefficient, temperature, pressure, full scale for the analog output).
- Send the setting or reading commands given below (the commands relating to speed or flow have an effect only in versions with SR option).

Serial commands in models with analog output

Command	Response	Description
Sn	&n sec	Sets the response time of index n for the analog outputs: n=1 ⇒ 1 s, n=2 ⇒ 2 s, n=4 ⇒ 4 s
S?	n sec	Reads the response time set for the analog outputs.
O3E	&	Shows alternately speed (or flow) and pressure on display .
O3D	&	Disables the alternating display of speed (or flow) and pressure.
O4E	&	Automatic change of speed resolution on display (0.1 ⇔ 0.01) depending on the measured value.
O4D	&	Fixed centesimal speed resolution on display.
O5E	&	Sets ft/s as speed unit of measurement on display. *Note*: the symbol ft/s does not appear on display.
O5D	&	Sets m/s as speed unit of measurement on display (default).
O6E	Model description	Enables "Debimo" sensor.
O6D	Model description	Enables Pitot or Darcy sensor (default).
O7E	Model description	Enables flow mode.

Command	Response	Description
O7D	Model description	Enables speed mode (default).
O8E	Model description	Sets m^3/min as flow unit of measurement .
O8D	Model description	Sets L/s as flow unit of measurement.
CK n.n…	&	Sets the Pitot or Darcy tube coefficient to the value n.n… The value must be between 0.6 and 1.2 (default = 1).
RK	n.nnnnn|	Reads the value of the Pitot or Darcy tube coefficient set in the transmitter.
D nnnn	nnnn mmq|	Sets and reads the duct section in mm^2.
CD n.n	&	Sets the "Debimo" blades coefficient to the value n.n (default=0.8).
CB nnnn.nn…	&	Sets the barometric pressure to the value nnnn.nn… mbar. The value must be between 500 and 1500 mbar (default = 1013.25 mbar).
RD	n.n|	Reads the value of the "Debimo" sensor coefficient set in the transmitter.
RB	nnnn.nnn|	Reads the value of the barometric pressure in mbar set in the transmitter.
CT n…	&	Sets the airflow temperature in tenths of °C (default = 160 ⇒ 16.0 °C). The value must be between -999 (⇒ -99.9 °C) and 2000 (⇒ 200.0 °C).
RT	n…|	Reads the value of the temperature, in tenths of °C, set in the transmitter.
CP nnnn…	&	Sets the differential static pressure in mbar (default = 0).
RP	nnnn…|	Reads the value of the differential static pressure set in the transmitter.
CS nnnn	&	In speed mode, sets the full scale speed, in hundredths of m/s, for the analog output (default = see table). The max settable value is 10000 (⇒ 100.00 m/s). In flow mode, sets the full scale flow in L/s or m^3/min.
RS	nn.nn|	In speed mode, reads the speed full scale value, in m/s, for the analog output. In flow mode, reads the flow full scale value, in L/s or m^3/min, for the analog output.
SV	nn.nn|	In speed mode, prints the max measurable speed as a function of the transmitter full scale pressure and values set for the parameters. The value is in the speed unit of measurement set in the transmitter. In flow mode, prints the max measurable flow in L/s or m^3/min.

To exit the configuration mode after sending the CAL START command, send the CAL END command. The transmitter automatically exits the configuration mode after 5 minutes from the last command sent.

4.2 Configuration of the models with RS485 output (HD404ST...)

RS485 Modbus address: the transmitter Modbus address is equal to the sum of the value set with the dip-switches 2…6 (value settable from 0 to 31) and the value set with the serial command WA (value settable from 1 to 216, default = 1). By setting a dip-switch to ON (upwards), the following values are added to the address:

	Dip-switch 2	Dip-switch 3	Dip-switch 4	Dip-switch 5	Dip-switch 6
ON	16	8	4	2	1
OFF	0	0	0	0	0

Example: if the dip-switches 2 and 4 are set to ON, and the dip-switches 3,5 and 6 are set to OFF, the value set with the dip-switches is 16+4=20. If the value set with the serial command WA is 1 (default value), the transmitter Modbus address is 20+1=**21**.

The dip-switches can be set even if the transmitter is powered, and the change is effective immediately.

Serial commands (RS485 port):

Proceed as follows:

- Connect the RS485 output to a PC USB port via the **RS48** cable. To use the RS48 cable, install the relevant USB drivers on your PC.
- To enable the configuration mode, set the **dip-switch 1** (the one closest to the terminal block) to **ON** (upwards), then power the transmitter.

  Note: the dip-switch 1 can be changed from OFF to ON even when the instrument is powered; in this case it is however necessary, after setting the dip-switch to ON, to press briefly (less than 0.5 seconds) the CAL ZERO button to enable the configuration mode (the transmitter model information appears on display, if present). Alternatively, power cycle the transmitter.
- On the PC, launch a standard serial communication software and set the baud rate to 57600, the communication parameters to 8N1 and the COM port number to which the instrument is connected.
- Send the **CAL START** command.
- Send the setting or reading commands given below (the commands relating to speed or flow have an effect only in versions with SR option).

Serial commands in models with RS485 output

Command	Description
Response time	
AVGn	Set the response time of index n for the measurement: n=0 ⇒ 0.125 s, n=1 ⇒ 1 s, n=2 ⇒ 2 s, n=4 ⇒ 4 s
AVG?	Reads the response time set for the measurement.
Visualization on display	
DU0	Pressure in Pa
DUF	Flow in l/min (only in the versions with SR option).
DUV	Speed in m/s (only in the versions with SR option).
OPT3E	Alternately speed (or flow) and pressure.
OPT3D	Disables the alternating display of speed (or flow) and pressure.
OPT4E	Automatic change of speed resolution (0,1 ⇔ 0,01) depending on the measured value.

Command	Description
OPT4D	Fixed centesimal speed resolution.
Parameters for air speed/flow measurement	
OPT6E	Enables "Debimo" sensor.
OPT6D	Enables Pitot sensor (default).
WK n.n…	Sets the Pitot or Darcy tube coefficient to the value n.n… The value must be between 0.6 and 1.2 (default = 1).
RK	Reads the value of the Pitot or Darcy tube coefficient set in the transmitter.
WD n.n…	Sets the "Debimo" sensor coefficient to the value n.n… The value must be between 0.6 and 1.2 (default = 1).
RD	Reads the value of the "Debimo" sensor coefficient set in the transmitter.
WS nnnn	Sets the duct section in mm^2.
RS	Reads the duct section in mm^2.
WB nnnn.nn…	Sets the barometric pressure to the value nnnn.nn… hPa. The value must be between 100 and 2000 hPa (default = 1013.25 hPa).
RB	Reads the value of the barometric pressure in hPa set in the transmitter.
WT nn.n	Sets the airflow temperature in °C. The value must be between -20.0 °C and +60.0 °C.
RT	Reads the value of the temperature in °C set in the transmitter.
WP nnnn…	Sets the differential static pressure in Pa (default = 0).
RP	Reads the value of the differential static pressure set in the transmitter.
Auto-zero	
ZFn	Sets the auto-zero interval of index n (only in the versions with AZ option): n=0 ⇒ disabled n=1 ⇒ 5 min n=2 ⇒ 10 min n=3 ⇒ 20 min n=4 ⇒ 30 min n=5 ⇒ 60 min (default)
ZF?	Reads the auto-zero interval set (only in the versions with AZ option)
Modbus parameters	
WA n...n	Sets the Modbus base address to the value n...n (1…216, default=1). **Warning: the actual Modbus address of the transmitter is equal to the base address set with this command plus the value set with the dip-switches.** Note: in the reply to the command, the previous actual address appears; the new address will appear in the replies to the next commands.
BAUD r...r	Sets the Modbus Baud Rate to the value r...r. The acceptable values are 9600 and 19200 (default = 19200). If the command is sent without the parameter r…r, the current setting is obtained.
PAR p	Sets the Modbus communication parameters of index p: p=O ⇒ 8O1 p=N ⇒ 8N2 p=E ⇒ 8E1 (default) If the command is sent without the index p, the current setting is obtained

Note: the replies of the HD404ST… transmitters always start with the address of the connected transmitter. For example, sending the RB command to a transmitter with Modbus address 1, the reply is "001: ATM pressure = 1013.250 hPa".

To exit the configuration mode after sending the CAL START command, send the CAL END command. The transmitter automatically exits the configuration mode after 5 minutes from the last command sent.

4.3 Notes on the configuration of the models with SR option

Resolution of the speed measurement: The speed is calculated from the pressure measure through a quadratic relationship. For this reason, the speed resolution is lower for low pressure values measured, and the change of the speed measurement on the display appears rather discontinuous if the fixed centesimal resolution is used. If a more uniform speed change on display is desired, enable the automatic speed resolution change as a function of the measured value (serial command O4E in the models HD404T…, serial command OPT4E in the models HD404ST…).

Flow measurement: the transmitter can be set in flow measurement mode (serial command O7E in the models HD404T…, serial command DUF in the models HD404ST…). The flow is calculated from the speed measurement and the duct section set. The flow mode is available both with Pitot and "Debimo" sensors.

4.4 Error messages on display

Undr: The measured value is less than the minimum measurable value.

OvEr: The measured value exceeds the maximum measurable value.

CAL Error: It appears at the end of the zero calibration if the maximum offset value possible to be corrected is exceeded.

CAL Perm Error: It appears after more than three consecutive CAL Errors.

5 Modbus-RTU protocol (HD404ST...)

To operate with the Modbus-RTU protocol be sure that the **dip-switch 1** (the one closest to the terminal block) is set to **OFF** (downwards). The dip-switch can be set to OFF even if the transmitter is powered, and the change is effective immediately.

By default, the transmitter has Modbus address **1** and communication parameters 19200, 8E1. The address and the communication parameters can be changed by using the appropriate serial commands [▶ p.15] or, alternatively, directly with Modbus commands by changing the value of the Holding Registers described later.

Below is the list of registers:

Input Registers

Address	Description	Format
3	Pressure in tenths of Pa (only HD404ST2…)	16-bit integer
4	Pressure in Pa (only HD404ST2…/T4…)	16-bit integer
5	Pressure in daPa (only HD404ST4…/T5AZ…)	16-bit integer
6	Pressure in hPa (only HD404ST4 no AZ /T5…)	16-bit integer
7	Pressure in kPa (only HD404ST5…)	16-bit integer
8	Pressure in hundredths of mmH_2O (only HD404ST2…/T4AZ…)	16-bit integer
9	Pressure in tenths of mmH_2O (only HD404ST2…/T4…)	16-bit integer
10	Pressure in mmH_2O (only HD404ST4…/T5AZ…)	16-bit integer
11	Pressure in thousandths of inchH_2O (only HD404ST2…/T4AZ…)	16-bit integer
12	Pressure in hundredths of inchH_2O (only HD404ST4…)	16-bit integer
13	Pressure in tenths of inchH_2O (only HD404ST4 no AZ /T5…)	16-bit integer
14	Pressure in inchH_2O (only HD404ST5…)	16-bit integer
15	Pressure in thousandths of mmHg (only HD404ST4AZ…)	16-bit integer
16	Pressure in hundredths of mmHg (only HD404ST4…)	16-bit integer
17	Pressure in tenths of mmHg (only HD404ST4 no AZ /T5AZ…)	16-bit integer
18	Pressure in mmHg (only HD404ST5…)	16-bit integer
19	Pressure in thousandths of PSI (only HD404ST4 no AZ)	16-bit integer
20	Pressure in hundredths of PSI (only HD404ST4 no AZ /T5…)	16-bit integer
21	Speed in hundredths of m/s (only models with SR option)	16-bit integer
22	Speed in hundredths of ft/s (only models with SR option)	16-bit integer
23	Flow in l/s (only models with SR option)	16-bit integer
24	Flow in l/min (only models with SR option)	16-bit integer
25	Flow in m^3/min (only models with SR option)	16-bit integer
26	Error register	16-bit integer

Reading a register not available for a particular model returns the value -32768 (0x8000).

If the pressure measurement is negative, the speed and flow registers return zero.

Error register

The bits of the error register signal, if set to 1, anomalies in the measurement. The bit 0 (the less significant one) indicates a measurement over-range of the transmitter. The bit 1 indicates whether the measurement is less than the minimum measurable (under-range). The bits 2 and 3 indicate sensor errors.

Holding Registers

Address	Description	Format
100	Modbus base address (from 1 to 216) **Warning: the actual Modbus address of the transmitter is equal to the base address set in this register plus the value set with the dip-switches.**	16-bit integer
101	Modbus Baud Rate Acceptable values: 3 (⇒ 9600) and 4 (⇒ 19200, default)	16-bit integer
102	Modbus communication parameters Acceptable values: 1 (⇒ 8N2), 2 (⇒ 8E1, default) and 4 (⇒ 8O1)	16-bit integer

To make the changes of the Holding Registers content active and permanent, write the hexadecimal value FF00 in the Coil Register with address 2.

Coils

Address	Description
2	Activation and permanent storage of the Holding Registers content changes.

6 Maintenance

Do not use aggressive cleaning agents or incompatible with the materials indicated in the technical specifications. For cleaning the housing, use a soft dry cloth or slightly dampened with clean water.

7 Safety instructions

The transmitter proper operation and operating safety can be ensured only in the climatic conditions specified in this manual and if all standard safety measures as well as the specific measures described in this manual are followed.

Do not use the instrument in places where there are:

- Corrosive or flammable gases.
- Direct vibrations or shocks to the instrument.
- High-intensity electromagnetic fields, static electricity.

User obligations

The transmitter operator shall follow the directives and regulations below that refer to the treatment of dangerous materials:

- EU directives on workplace safety.
- National law regulations on workplace safety.
- Accident prevention regulations.

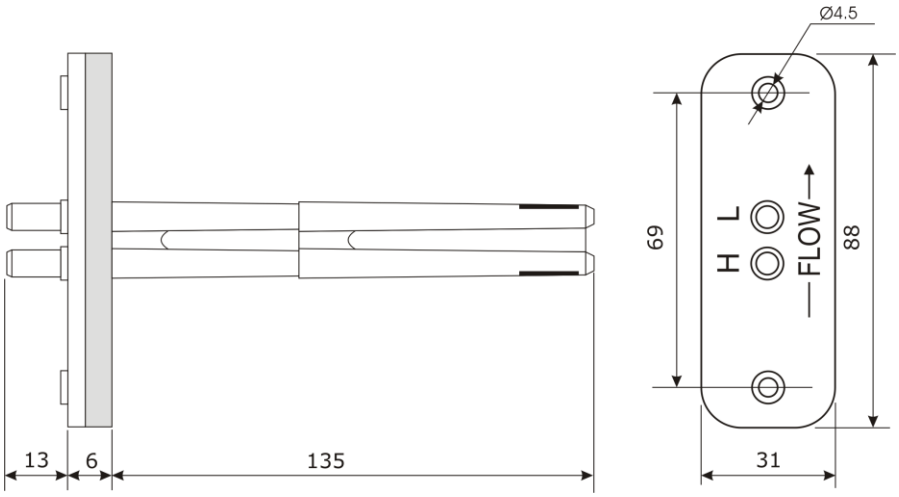
8 Accessories ordering codes

The transmitter is supplied with 2 m of silicone tubing ∅5 mm internal/ ∅8 mm external and two plastic fittings for ducts (HD434T.5).

PC connecting cable must be ordered separately.

Optional accessories

AP3721 Plastic flow port for cylindrical duct.



For the available Pitot tubes, please visit Senseca website.

PC connecting cables

CP27 PC connecting cable for the transmitter configuration. With built-in RS232/USB converter. 3-pole connector on transmitter side and A-type USB connector on PC side. **For HD402Tx, HD402ATx, HD402TRx.**

RS48 PC connecting cable for the transmitter configuration. With built-in RS485/USB converter. 3 open wires on transmitter side and A-type USB connector on PC side. **For HD402STx.**

Spare parts

HD434T.5 2 m of silicone tubing ∅5 mm internal/ ∅8 mm external and two plastic fittings for ducts.

NOTES

NOTES

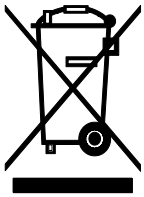
WARRANTY

The manufacturer is required to respond to the "factory warranty" only in those cases provided by Legislative Decree 6 September 2005 - n. 206. Each instrument is sold after rigorous inspections; if any manufacturing defect is found, it is necessary to contact the distributor where the instrument was purchased from. During the warranty period (24 months from the date of invoice) any manufacturing defects found will be repaired free of charge. Misuse, wear, neglect, lack or inefficient maintenance as well as theft and damage during transport are excluded. Warranty does not apply if changes, tampering or unauthorized repairs are made on the product. Solutions, probes, electrodes and microphones are not guaranteed as the improper use, even for a few minutes, may cause irreparable damages.
The manufacturer repairs the products that show defects of construction in accordance with the terms and conditions of warranty included in the manual of the product. For any dispute, the competent court is the Court of Padua. The Italian law and the "Convention on Contracts for the International Sales of Goods" apply.

TECHNICAL INFORMATION

The quality level of our instruments is the result of the continuous product development. This may lead to differences between the information reported in the manual and the instrument you have purchased.
We reserve the right to change technical specifications and dimensions to fit the product requirements without prior notice.

DISPOSAL INFORMATION



Electrical and electronic equipment marked with specific symbol in compliance with 2012/19/EU Directive must be disposed of separately from household waste. European users can hand them over to the dealer or to the manufacturer when purchasing a new electrical and electronic equipment, or to a WEEE collection point designated by local authorities. Illegal disposal is punished by law.

Disposing of electrical and electronic equipment separately from normal waste helps to preserve natural resources and allows materials to be recycled in an environmentally friendly way without risks to human health.

CE RoHS

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