



SENSOR ELECTRONIC & MEASUREMENT EQUIPMENT
 PL-44-100 Gliwice, ul. Odlewników 18
 Fax: +48-32/ 237-26-88
 e-mail: strychar@polsl.gliwice.pl

ThermoAnemometer Measurements System HT-400

TECHNICAL DATA AND CONSTRUCTION

1. TRANSDUCER UNIT HT-426-0 with PROBE HT-412

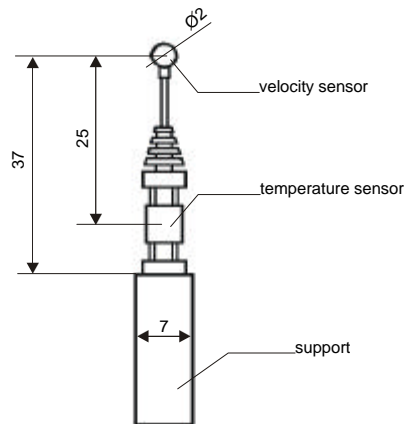
- type of velocity sensor:	omnidirectional, spherical
- diameter of velocity sensor	2mm
- measurement velocity range:	0.05 to 5 m/s
- repeatability:	
	range of 0,05 to 1m/s
	range of 1 to 5m/s
- automatic temperature compensation accuracy:	$\pm 0.02\text{m/s} \pm 1\%$ of readings $\pm 3\%$ of readings better than $\pm 0.1\%/K$
- upper frequency f_{up}^{*1} :	min. 0,5Hz
- mean velocity directional sensitivity MDS $*2$:	-4%
- turbulence intensity directional sensitivity TDS $*3$:	7%
- temperature range:	-10 to +50 °C
- accuracy of temperature measurement:	0.2 °C
- outputs:	analogue current $I_v = 0 \div 20\text{mA}$; $I_t = 0 \div 20\text{mA}$ (converted to voltage in the multichannel power supply HT-430 or connector unit HT-440)
temperature:	linear $t [^\circ\text{C}] = 2,5 \cdot I_t [\text{mA}]$
velocity:	non-linear (set of equations) $V [\text{m/s}] = f(0,25 \cdot I_v)$
- max output resistance:	450 Ohm
- max length of probe cable $*4$:	5 m
- power supply:	12VDC/200mA

*1) The upper frequency is defined as the highest frequency up to which the standard deviation ratio remains in the limits of 0.9 to 1.1 (see to ASHRAE Transaction Vol.1, 1998, paper No SF-98-20-2).

*2) MDS is measure of the maximum error introduced in the mean velocity measured by the anemometer with an omnidirectional probe (see to ASHRAE Transaction Vol.1, 1998, paper No SF-98-20-1)

*3) TDS is defined as a ratio in percent between the standard deviation created by the directionally induced velocity variations and the mean velocity.

*4) The probe is connected permanently to the transducer unit.

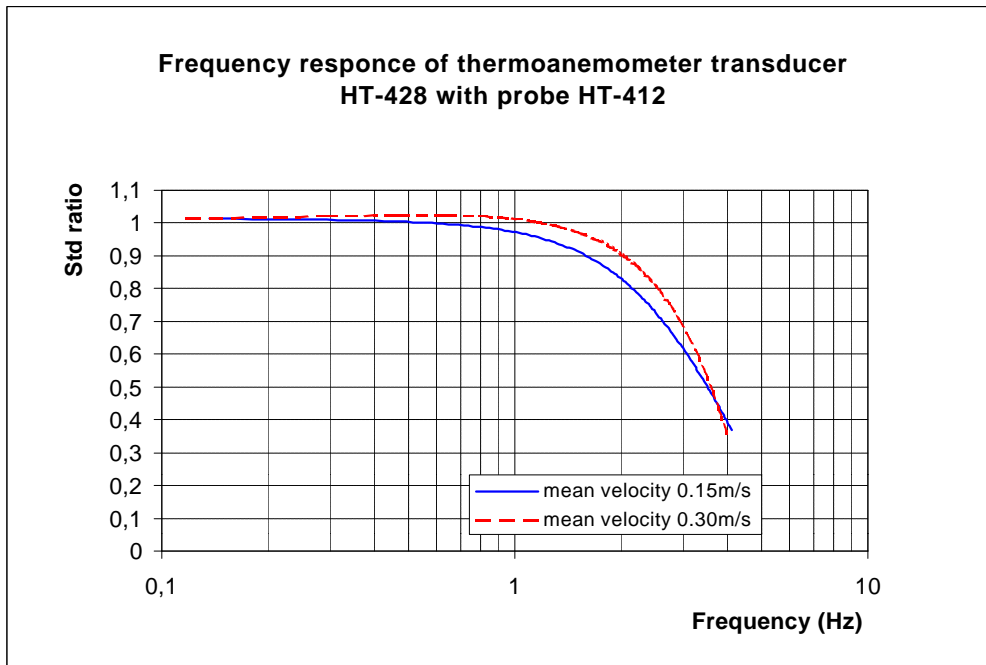


Probe HT-412

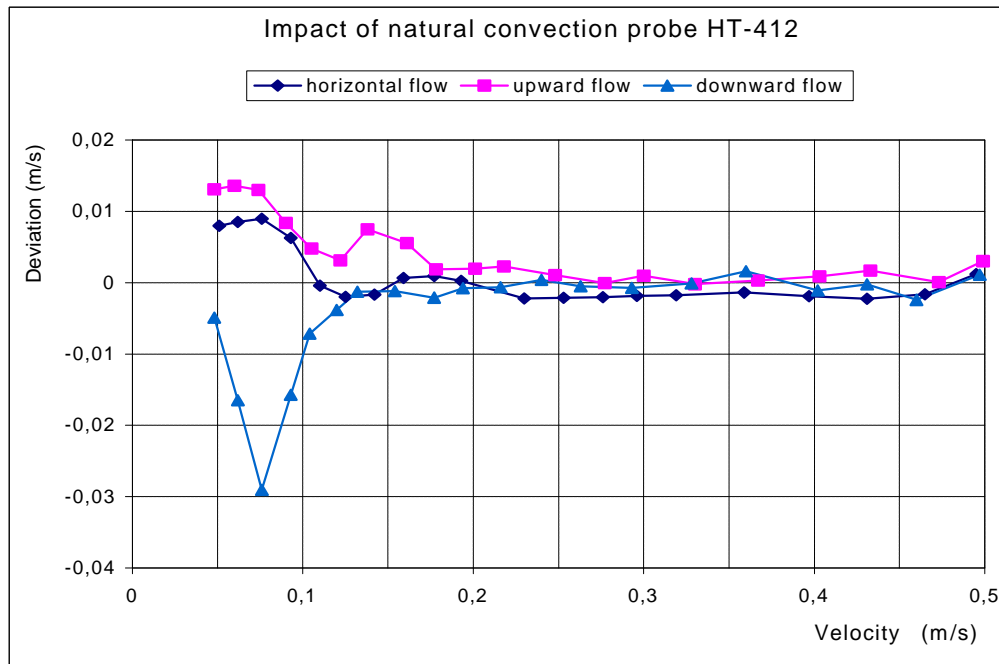
2. TRANSDUCER UNIT HT-428-0 with increase upper frequency

- upper frequency $f_{up}^{*1)}$: min. 1Hz typ. 1.5Hz
 the other technical data as pos.1

*1) The upper frequency is defined as the highest frequency up to which the standard deviation ratio remains in the limits of 0.9 to 1.1 (see to ASHRAE Transaction Vol.1,1998, paper No SF-98-20-2).
 The standard deviation ratio as a function of the frequency is presented in the figure below.



Transducer unit HT-428 with probe HT-412 perform new requirements for low-velocity measuring instruments that are described in the AE Transaction Vol.1, 1998, paper No SF-98-20-5



3. TRANSDUCER UNIT HT-42x-L with linear velocity output

- linearity error: $\pm 2\%$ of readings
- outputs: analogue current $0 \div 20 \text{ mA}$
(converted to voltage in the multichannel power supply HT-430 or connector unit HT-440)
- temperature: linear $t [^{\circ}\text{C}] = 2,5 \cdot I_t [\text{mA}]$
- velocity: linear $V [\text{m/s}] = 0,25 \cdot I_v [\text{mA}]$
- max output resistance: 450 Ohm

HT-426-L or HT-428-L differs from HT-426-0 or HT-428-0 in the built in electronic module for linearizing analogue value of velocity output.

4. TRANSDUCER UNIT HT-42x-0x with voltage outputs

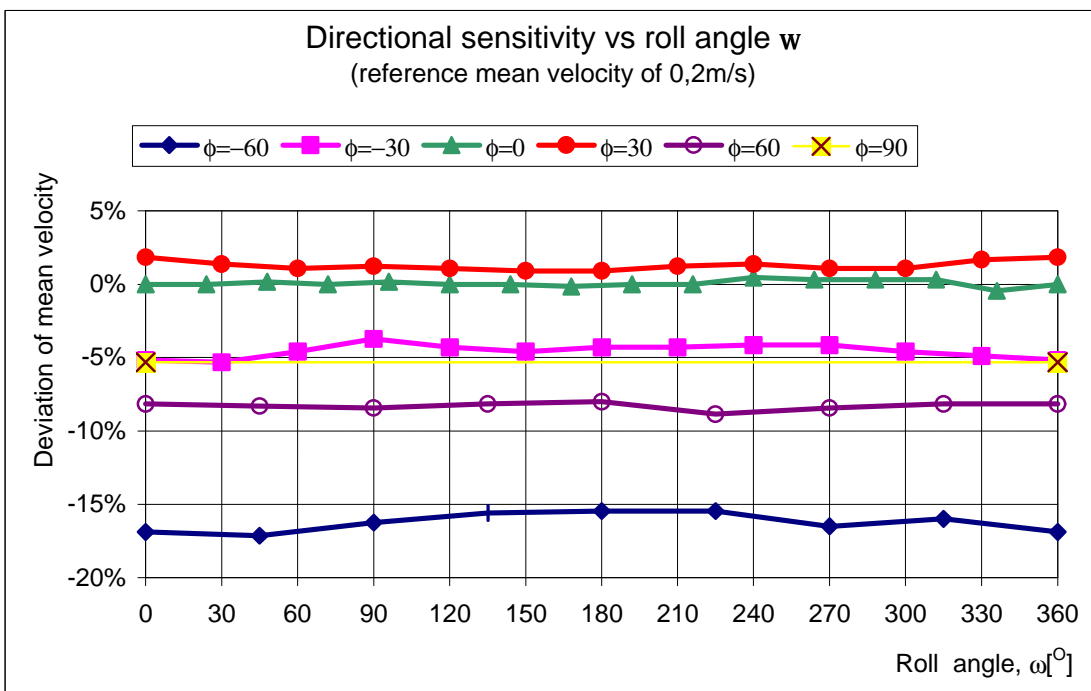
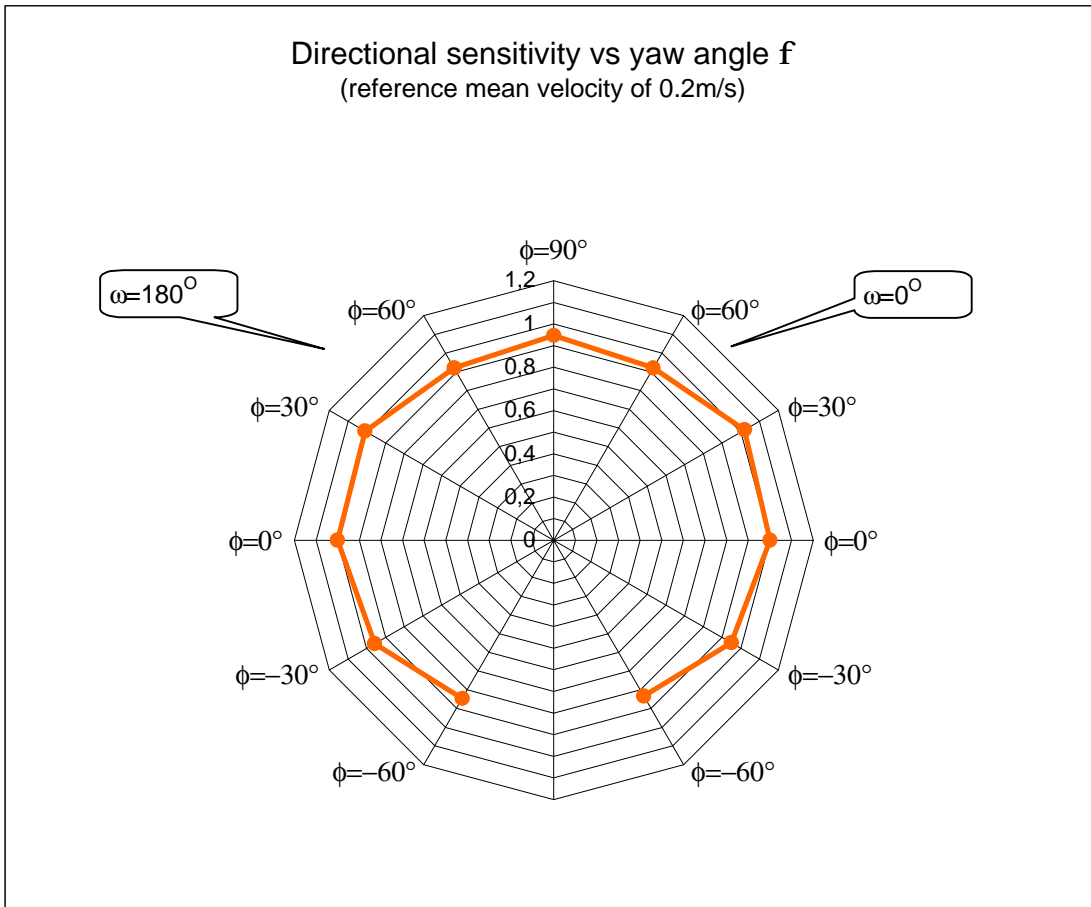
- outputs: analogue voltage $0 \div 1 \text{ V}$, $0 \div 2 \text{ V}$ or $0 \div 5 \text{ V}$
- temperature: linear $t [^{\circ}\text{C}] = 50 \cdot U_t [\text{V}]$, $25 \cdot U_t [\text{V}]$ or $10 \cdot U_t [\text{V}]$
- velocity: non-linear (set of equations) $V [\text{m/s}] = f(U_v)$

HT-42x-01, HT-42x-02 or HT-42x-05 with voltage outputs are preferred in systems with short distance between transducers and computer (max length of transducer cable is 2m).

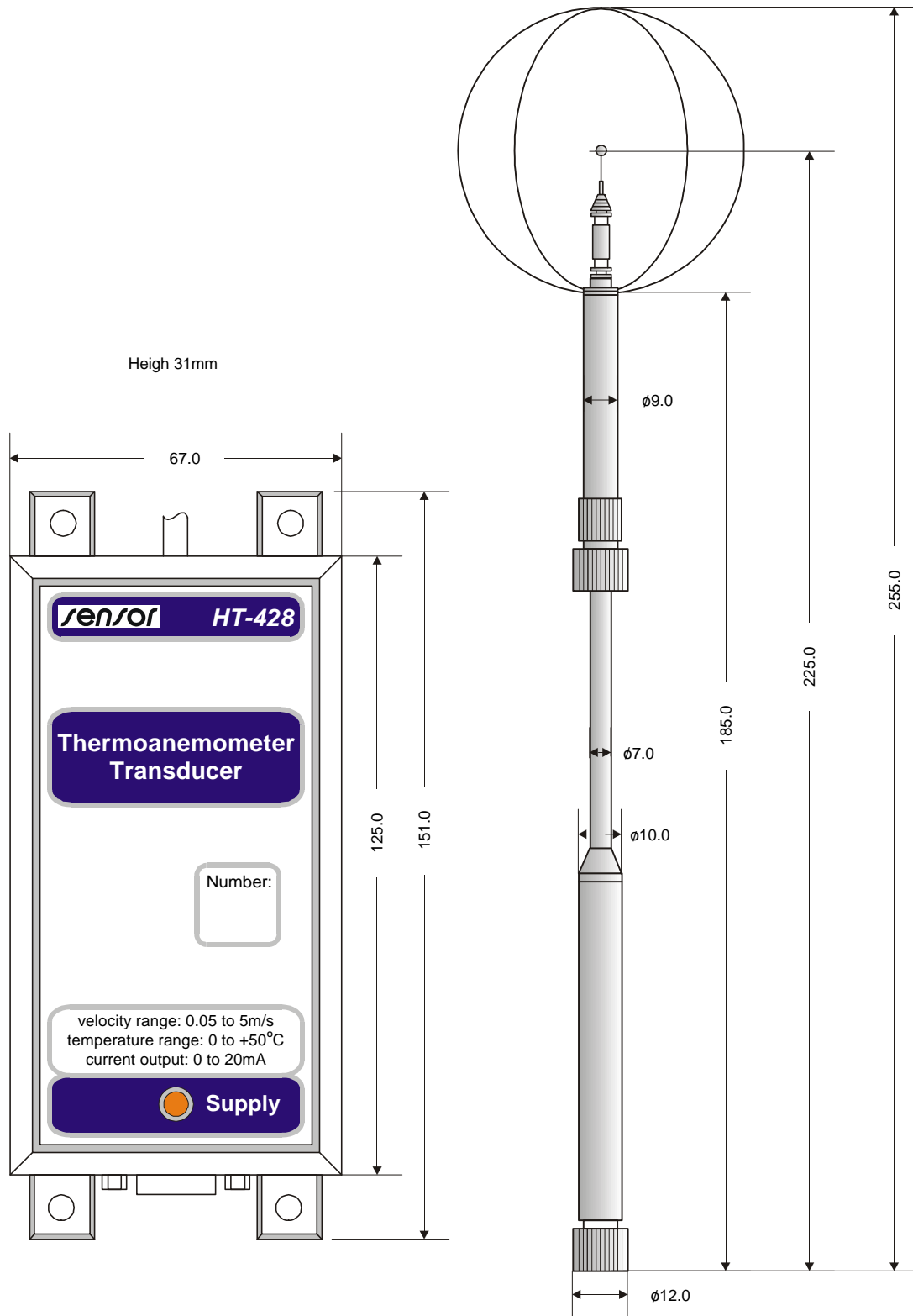
5. TRANSDUCER UNIT HT-42x-L5 with linear voltage outputs

- outputs: analogue voltage $0 \div 5 \text{ V}$
- temperature: linear $t [^{\circ}\text{C}] = 10 \cdot U_t [\text{V}]$
- velocity: linear $V [\text{m/s}] = U_v [\text{V}]$

HT-426-L5 or HT-428-L5 are preferred in the systems with short distance between transducers and computer (max length of transducer cable is 2m).



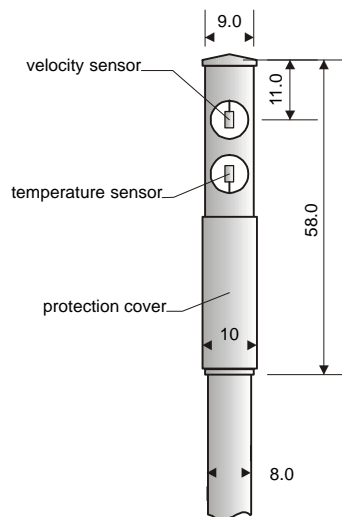
Dimension (mm) of Probe HT-412-x and Transducer Unit HT-42x



6. TRANSDUCER UNIT HT-426C-0 with PROBE HT-415

- type of velocity sensor:	cylindrical
- measurement velocity range:	0,15 to 10 m/s
- repeatability:	range of 0,15 to 1,5m/s $\pm 0.03\text{m/s} \pm 1\%$ of readings range of 1,5 to 10m/s $\pm 3\%$ of readings
- automatic temperature compensation accuracy:	better than $\pm 0,2\%/K$
- temperature range:	-10 to +50 °C
- accuracy of temperature measurement:	0,2 °C
- outputs:	analogue current $I_v = 0 \div 20\text{mA}$; $I_t = 0 \div 20\text{mA}$ (converted to voltage in the multichannel power supply HT-430 or connector unit HT-440)
temperature:	linear $t [^\circ\text{C}] = 2,5 \cdot I_t [\text{mA}]$
velocity:	non-linear (set of equations) $V [\text{m/s}] = f(0,25 \cdot I_v)$
- max output resistance:	450 Ohm
- max length of probe cable *1):	5 m
- power supply:	12VDC/200mA

*1) The probe is connected permanently to the transducer unit.



Probe HT-415

7. TRANSDUCER UNIT HT-426C-L with linear velocity output

- linearity error:	$\pm 2\%$ of readings
- outputs:	analogue current $0 \div 20\text{mA}$ (converted to voltage in the multichannel power supply HT-430 or connector unit HT-440)
- temperature:	linear $t [^\circ\text{C}] = 2,5 \cdot I_t [\text{mA}]$
- velocity:	linear $V [\text{m/s}] = 0,5 \cdot I_v [\text{mA}]$
- max output resistance:	500 Ohm

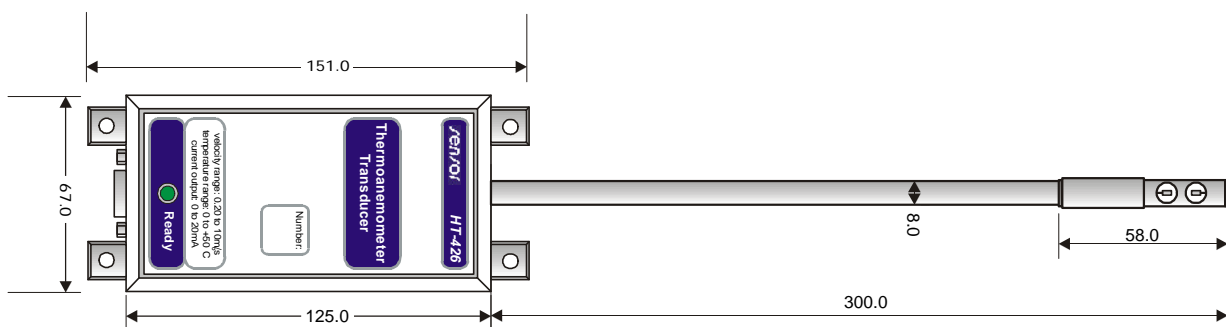
HT-426C-L differs from HT-426C-0 in the built in electronic module for linearizing analogue value of velocity output.

8. TRANSDUCER UNIT HT-426C-L5 with linear voltage outputs

- outputs: analogue voltage $0 \div 5V$
- temperature: linear $t [^{\circ}C] = 10 \cdot U_t [V]$
- velocity: linear $V [m/s] = 2 \cdot U_v [V]$

HT-426C-L5 is preferred in the systems with short distance between transducers and computer (max length of transducer cable is 2m).

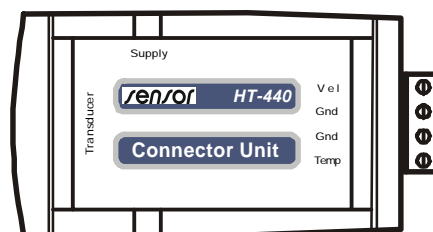
Dimension (mm) of Probe HT-415-0 and Transducer Unit HT-426C



9. CONNECTOR UNIT HT-440

- signal input: current $0 \div 20mA$
- signal output: voltage $0 \div 1V$, $0 \div 2V$ or $0 \div 5V$
- number of outputs: temperature: 1
velocity: 1
- power supply voltage DC: 12V/200mA or 24V/150mA

Connector unit transforms current output signals from transducer unit to voltage and makes possible to supply the transducer. The signal output and power supply of connector unit can be different as specified in the chapter 14.



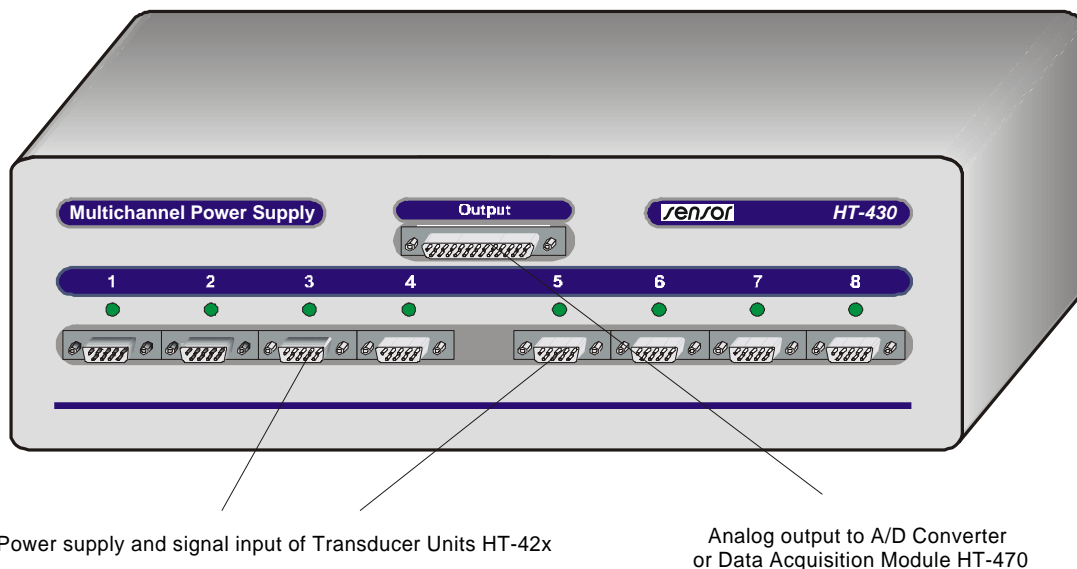
10. MULTICHANNEL POWER SUPPLY HT-430 (or new version Low Profile HT-432)

- output of power supply DC: 8x12V/250mA
- signal input: current 0÷20mA
- signal output: voltage 0÷1V, 0÷2V or 0÷5V
- number of channels: temperature: 8
velocity: 8
- power supply voltage AC: 220V/50Hz or 120V/60Hz
- max power consumption: 50W

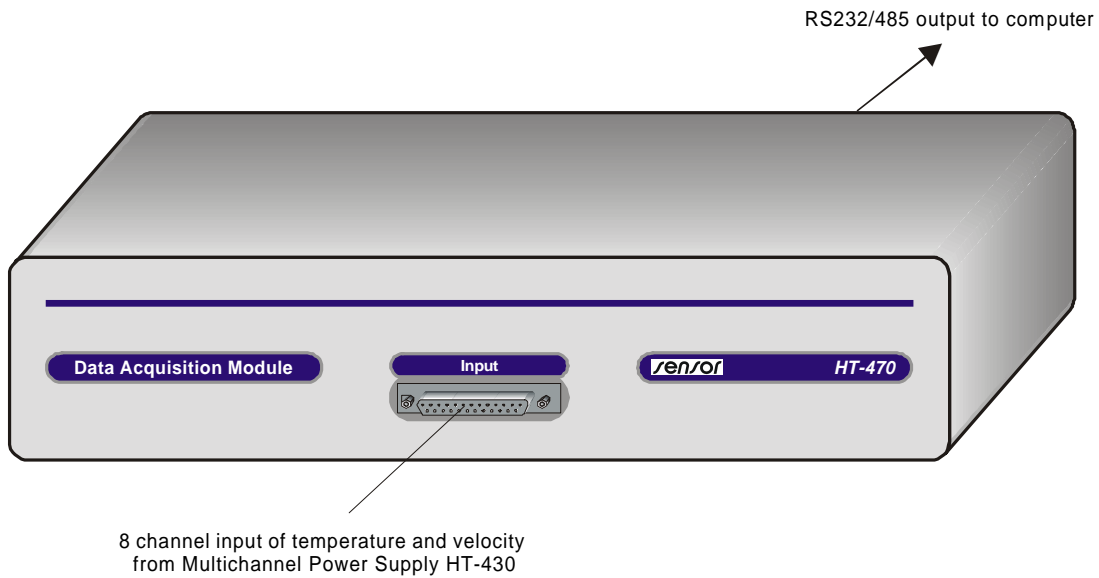
Multichannel power supply is double function instrument:

- it creates 8 DC voltage galvanic insulated for supply the transducer units,
- it transforms current output signal from transducer units (0÷20 mA) to voltage signals (0÷1V, 0÷2V, 0÷5V) that are used to connect to A/D converter in computer or data acquisition module HT-470.

Eight sets of transducer unit and probe can be connected to HT-430, which has a voltage output for each set (one for temperature and second for velocity). The voltage measurement outputs of HT-430 can be different as specified in the chapter 14.

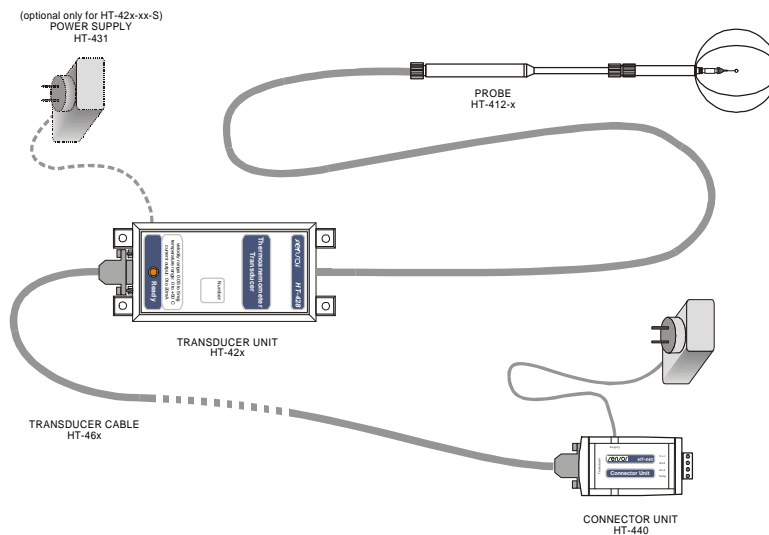
**11. DATA ACQUISITION MODULE HT-470 (or new ver. with integrated 8-channel power supply HT-480)**

- input range: 0÷5V
- input channel: 16 differential (8 temperature, 8 velocity)
- resolution: 12bit
- input impedance: 20M Ohms
- frequency: 80Hz
- output: RS232/485
- baud rate: 115200bps
- software: for Windows 95/98/2000
- power supply: 220V/50Hz or 120V/60Hz



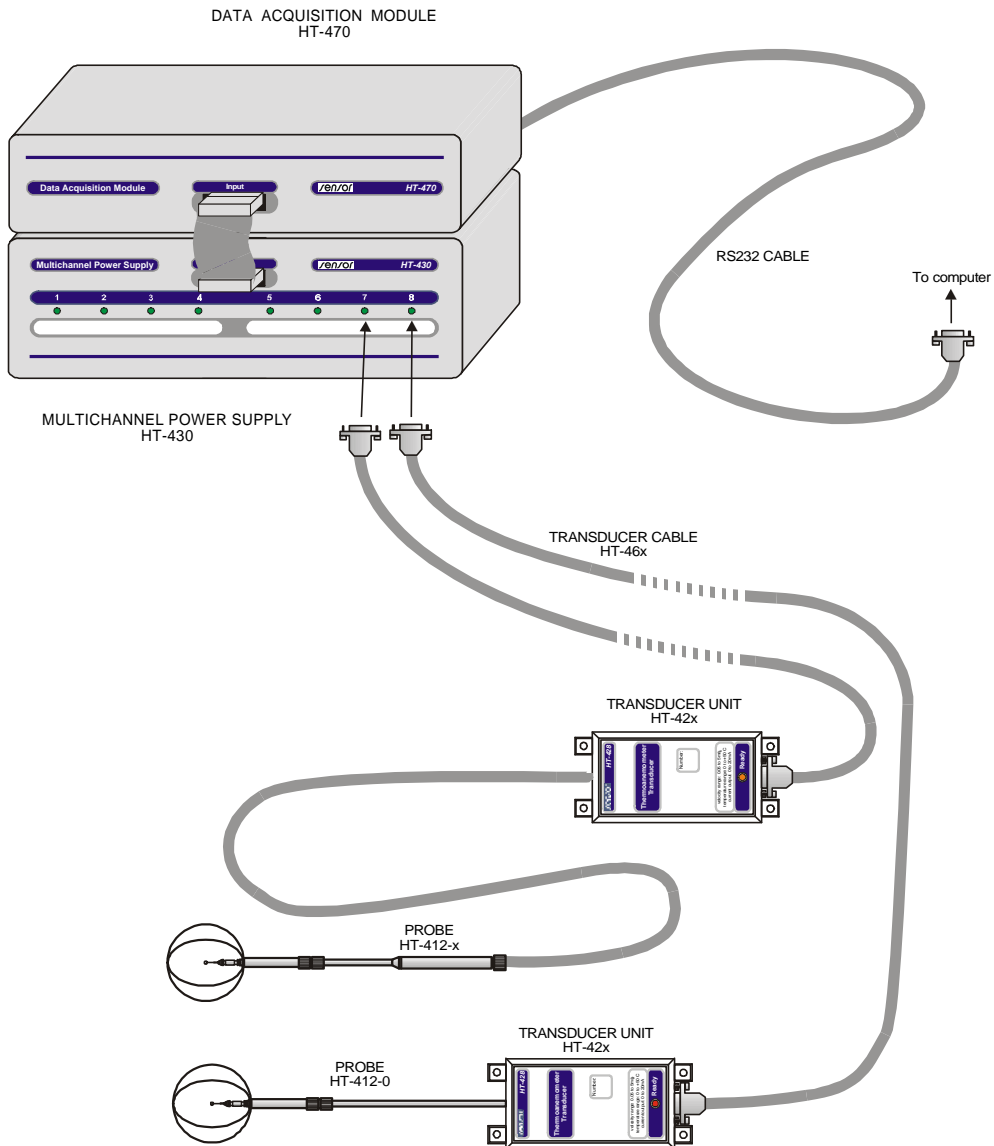
12. SINGLE CHANNEL SYSTEM

The sets of transducer unit, anemometer probe, AC/DC adapter, connector unit, transducer cable are used to perform single point velocity and temperature measurements. Connector unit transforms current output signals from transducer unit to voltage and makes possible to supply the transducer. The usage of transducer units with built-in DC socket (suffix -S) and voltage velocity output is preferred if the length of transducer cable is shorter than 2m. Thus the connector unit isn't necessary. The length of the probe cable and transducer cable can be different.



13. MULTICHANNEL SYSTEM

Multichannel measurement system series HT-400 consists of hot-sphere-type anemometer probes HT-412 or cylindrical probes HT-415, transducer units HT-426 or HT-428, connecting cables HT-46x and multichannel power supply HT-430. The data acquisition module HT-470 with software for Windows 95/98/2000 may be attached. The full standard system comprises eight measurement channels. The system may be extended for 16 points to use two sets of multichannel power supply and data acquisition module. In this case the second acquisition module is connected via RS485 output to first.



14. HOW TO PURCHASE ?

Probe spherical		
	without cable probe	HT-412-0
	with probe cable length 1m	HT-412-1
	with probe cable length 2m	HT-412-2
	with probe cable length 3m	HT-412-3
Transducer unit for probe spherical		standard quality increase upper frequency
	non-linear velocity output 0-20mA	HT-426-0 HT-428-0
	with linear velocity current output 0-20mA	HT-426-L HT-428-L
	with non-linear voltage output 0-1V	HT-426-01 HT-428-01
	with non-linear voltage output 0-2V	HT-426-02 HT-428-02
	with non-linear voltage output 0-5V	HT-426-05 HT-428-05
	with linear voltage velocity output 0-5V	HT-426-L5 HT-428-L5
	with built-in DC power supply socket	HT-42x-xx-S
Probe cylindrical		
	without cable probe	HT-415-0
	with probe cable length 1m	HT-412-1
	with probe cable length 2m	HT-412-2
	with probe cable length 3m	HT-412-3
	with probe cable length 5m	HT-412-5
Transducer unit for probe cylindrical		
	non-linear velocity output 0-20mA	HT-426C-0
	with linear velocity current output 0-20mA	HT-426C-L
	with non-linear voltage output 0-5V	HT-426C-05
	with linear voltage velocity output 0-5V	HT-426C-L5
	with built-in DC power supply socket	HT-426C-xx-S
Multichannel power supply with outputs 0-1V		HT-430-1 (new HT-432-1)
	with outputs 0-2V	HT-430-2 (new HT-432-2)
	with outputs 0-5V	HT-430-5 (new HT-432-5)
	option for power supply 110V/60Hz	HT-432-x-V
Power supply single (<u>AC220V 50Hz</u> /DC12V 250mA)		HT-431
Connector unit with current output		HT-440-0
	with voltage output 0-1V	HT-440-1
	with voltage output 0-2V	HT-440-2
	with voltage output 0-5V	HT-440-5
	with power supply DC24V	HT-440S-x
Transducer cable length 1m		HT-461
	length 2m	HT-462
	length 5m	HT-465
	length 10m	HT-466
	length 20m	HT-467
Data acquisition module (8 channel with RS232/485)		HT-470
	option for power supply 110V/60Hz	HT-470-V
Measurement station with integrated 8-channel power supply and Data acquisition module)		HT-480 (new)
	option for power supply 110V/60Hz	HT-480-V