RS-485 SENSOR WIRE COLORS (unified for all BARANI sensors)			
WHITE = GND	BROWN = VCC	GREEN = A	YELLOW = B
POWER & COM GROUND	POWER FOR SENSORS	NON-INVERTING	INVERTING

Make sure your GND and VCC polarity is not reversed.

Different RS-485 notations mix A & B, inverting & non-inverting, + & - notation for RS485 communication lines.

Heated anemometer will draw up to 1 Ampere resulting in a significant voltage drop in the wires of its cable.

Voltage drop per 10m of cable:
1Amp, 24AWG stranded copper
= -1.8V (round trip considered)

Bayonet connector is standard on all BARANI sensors:

- water proof (-40...80°c)
- positive locking
- NBR rubber o-ring
- unified wiring for all BARANI sensors

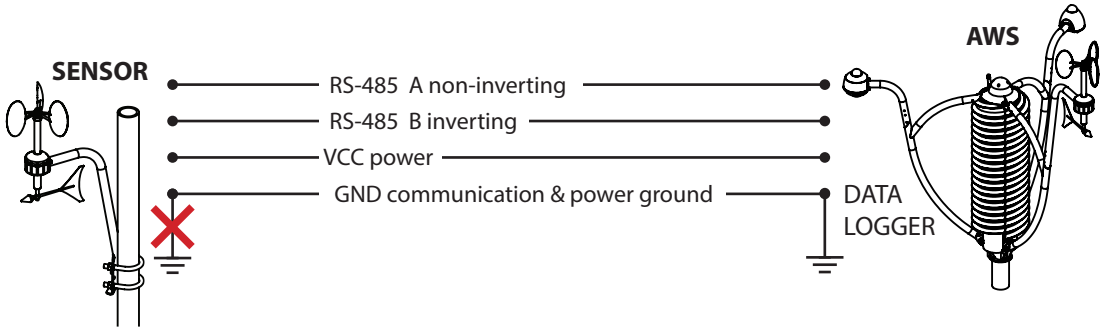
Grounding and shielding recommendations for sensor and logger cable		
Sensor carrier	Sensor	Shielding / Ground
Grounded metallic mast	Grounded mounting of sensor to mast (mounting of sensor metallic body via conducting metallic brackets or holders to mast)	Connect cable shield only at the side of the data logger to ground, otherwise current will flow in shielding and cause problems in communication with sensors. This type of connection requires sensor electronics not be grounded to sensor body to avoid ground loop communication problems.
	Isolated mounting of sensor on mast (by non-metallic /non-conducting brackets or metallic brackets with isolated plastic / rubber adapters)	Connect cable shield on both sides (to sensor & logger) to create a single continuous ground potential. A uniform ground potential will not cause ground loops and provide best protection from even strong interference.
Not-grounded metallic mast	Grounded mounting of sensor to mast (mounting of sensor metallic body via conducting metallic brackets or holders to mast)	
Non-metallic meteo mast	Sensor is isolated by default when using a non-metallic mast. In dusty or dry blowing snow conditions, static electricity buildup may cause ESD discharges. BARANI sensors are well protected up to 15kV ESD discharge.	Non-shielded grounding wire should be attached all the way up the mast to discharge ESD buildup and finished with a lightning rod sharpened toward the sky. Sensors & logger should not be connected to it. Wire should be well grounded and made of highly conductive material.
BARANI sensors	All BARANI sensors (even in metal bodies) contain internally isolated electronics. It is nevertheless recommended that mounting of non-metallic /non-conducting brackets or metallic brackets with isolated plastic / rubber adapters to create an extra layer of protection from extremely high lighting induced discharges.	

QUICK TIPS

- If logger and sensor use two different power sources or wall outlets, even if only a few feet apart, ground loops may form and cause communication problems and errors.
- More than one grounding point for a sensor net usually results in communication problems from ground loops.
- Data logger and sensor must share a common grounding point to avoid ground loops.

Sensor metal housing is isolated from metallic mast and not connected to communication nor power ground.

Different ground potential (±V) at sensor is therefore isolated from the 0V GND potential of the electrical system, preventing ground loop current flow.



SENSOR INPUT REGISTER MAP (MODBUS input registers contain sensors readings)				
offset	name	type	unit	output = value
0	temperature	i16	0.01°C	2312 = 23.12°C
1	dewpoint	i16	0.01°C	945 = 9.45°C
2	pressure_low	u32	1Pa	100123 = 100123Pa
3	pressure_high			
4	humidity	u16	0%	5000 = 50.00%
5	wind speed	u16	0.01 m/s	123 = 1.23 m/s
6	wind direction	u16	0.01°	27521 = 275.21°
7	avg. wind speed / period	u16	0.01 m/s	123 = 1.23 m/s
8	max. wind speed / period	u16	0.01 m/s	123 = 1.23 m/s

SENSOR HOLDING REGISTER MAP		
offset	name	type
0	hardware no.	u16
1	firmware no.	u16
2	serial no. [15..0]	u32
3	serial no. [31..16]	
10	period (seconds)	u16
Please keep in mind that our sensors use PDU addressing. (1st reference starts at 0, not 1)		
MODBUS REGISTER DATA FORMATS		
i16 = signed 16-bit integer		

FACTORY MODBUS SETTINGS

MODBUS RTU: 19200Bd 8N1 * (Speed=19200 Baud, parity=none, stop bit=1, MODBUS Address=1)
* Address, speed, parity, stopbits are user selectable
MODBUS ASCII, per special request.

To minimize power consumption from excessive communication and elliminate any self heating effects, read all succesive registers with a single command.

Average current consumption of RS-485 version of MeteoWind is anegligible industry leading 310µA when reading at 1minute intervals.

PDU addressing is used in all BARANI sensors.
PDU = 1st register starts with 0, not 1

Common mistakes to check for:

- swapped A / B wires
- wrong speed
- wrong parity
- wrong stop bit
- wrong address
- ASCII instead of RTU
- 1st register reference offset not 0
- power not connected
- improper grounding (ground loops)

NOTES:

1.

To change MODBUS address you will have to use 2 holding registers			
1) Holding register #5			
Its default value is 0x0106 (HEX reading – green line in table) and we can simplify the meaning into 2 separate bytes:			
Modbus address:	01	Allowed values 01-7F (HEX)	01 = address 1
Baudrate address:	06	Allowed values 01-10 (HEX)	06 = 19200bps (see baudrates table below)
To change the address simply write a new value into register. The sensor will change its address/baudrate immediately. However the settings are not stored permanently yet. If you reset the device now (disconnect power and reconnect) it will communicate with the original settings. To make the settings permanent you have to write command into another holding register (with new address/baudrate settings)			
2) Holding register #11 (to permanently store new settings)			
Write value 0x0008 (HEX) or simply 8 into this register. Its value should be changed to 0x0000 (HEX) immediately as acknowledgment of the command. Now the address/baudrate settings are stored permanently.			

HOLDING REG. 5		R	MODBUS ADDRESS							R	R	R	BAUDRATE					R = reserved bit
hex	decimal	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0	
0106	262	0	0	0	0	0	0	0	1	0	0	0	0	0	1	1	0	Slave ID address 1 (DEFAULT)
0206	518	0	0	0	0	0	0	1	0	0	0	0	0	0	1	1	0	Slave ID address 2
7F06	32518	0	1	1	1	1	1	1	1	0	0	0	0	0	1	1	0	Highest Slave ID address 127

hex	decimal	4	3	2	1	0	
01	1	0	0	0	0	1	1200bps
02	2	0	0	0	1	0	2400bps
03	3	0	0	0	1	1	4800bps
04	4	0	0	1	0	0	9600bps
05	5	0	0	1	0	1	14400bps
06	6	0	0	1	1	0	19200bps (DEFAULT)
07	7	0	0	1	1	1	28800bps
08	8	0	1	0	0	0	38400bps
09	9	0	1	0	0	1	56000bps
0A	10	0	1	0	1	0	57600bps
0B	11	0	1	0	1	1	115200bps
0C	12	0	1	1	0	0	128000bps
0D	13	0	1	1	0	1	230400bps
0E	14	0	1	1	1	0	256000bps
0F	15	0	1	1	1	1	460800bps

COMBINING 16bit REGISTERS TO 32bit VALUE

Pressure registers 2 & 3 in SENSOR INPUT REGISTER MAP of this guide are stored as u32 (UNSIGNED 32bit INTEGER)

You can either set Display / Long in Modbus Poll software or calculate pressure manually :

1) Determine what display you have - if register values are positive skip to step 3.
2) Convert negative register 2 & 3 values from Signed to Unsigned (note: 65536 = 2^{16}):
   (reg 2 value) + 65536* = 35464 ; (reg 3 value) + 65536 = 1
3) Shift register #3 as this is the upper 16 bits: 65536 * (converted reg 3 value) = 65536
4) Put two 16bit numbers together: (converted reg 2 value) + (converted reg 3 value) = 35464 + 65536 = 101000 Pa

Pressure information is then 101000 Pascal.