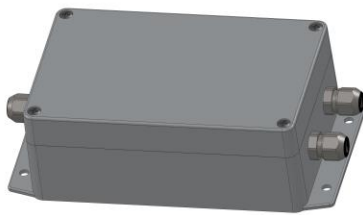


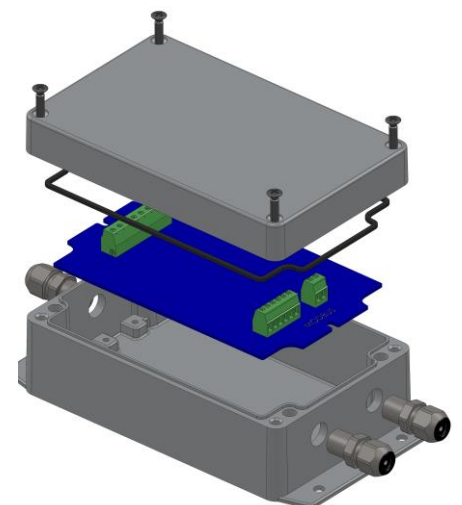
MOBUS – Modbus Adapter



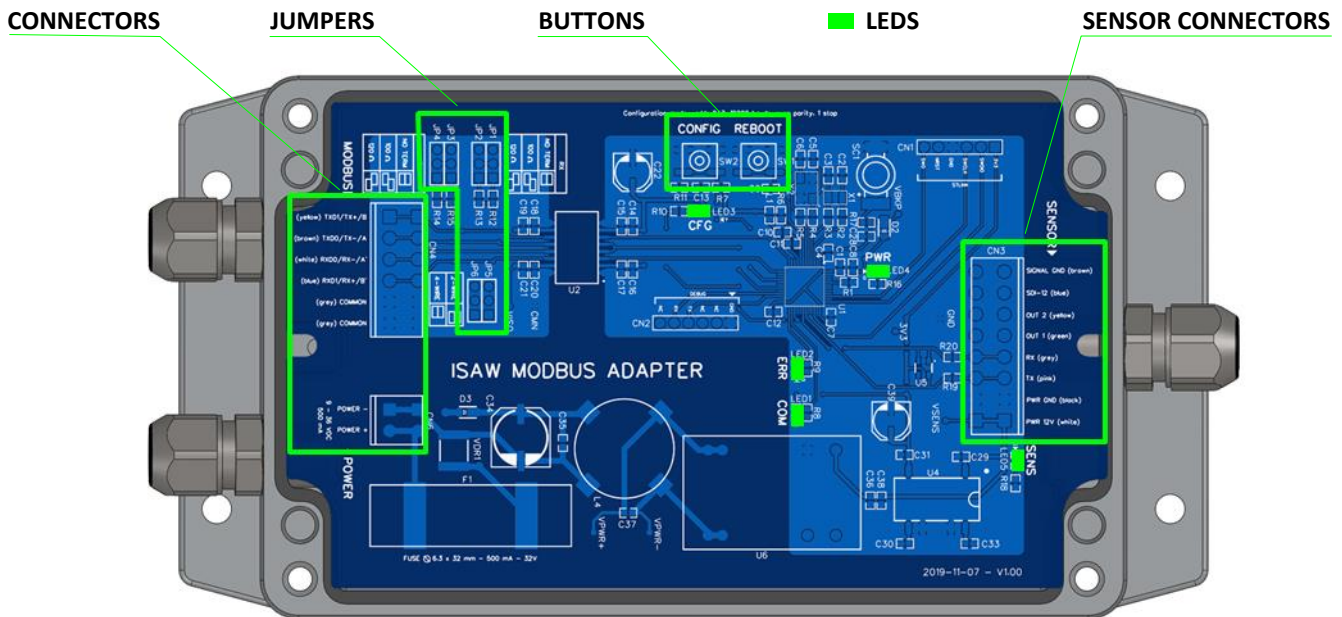
The ISAW Modbus RTU RS485 Adapter (MOBUS) enables the power supply and connection of any ISAW sensor to a Modbus network. MOBUS is the recommended accessory to interconnect the sensor through the open serial Modbus RTU (RS-485) protocol based on a master/slave or client/server architecture. The fieldbus environment is the base level group of digital networks in the hierarchy of plant networks.

CHARACTERISTICS	
Protocol	MODBUS RTU (V1.1b3)
Physical Layer	EIA/TIA-485 (RS485) 2-wire and 4-wire
Galvanic isolation	Power 3kV RMS, Bus 5kV RMS
Unit load	1/8 unit load, up to 256 nodes on the bus
Startup time	1 s
Power supply	9 to 36 VDC (Typ. 100 mA, Max. 500 mA)
Operating temperature	-40°C to 80°C
Implemented function codes	0x04 Read Input Registers 0x03 Read Holding Registers 0x06 Write Single Register 0x10 Write Multiple Registers 0x64 Pass-through 0x08 Diagnostic 0x17 Report Server ID
Configurable Baud rate	9600, 19200, 38400, 57600, 115200, 128000, 256000
Configurable Parity	No, Odd, Even
Configurable Stop Bit	1 or 2
Configurable Address	1 to 247

DEFAULT COMMUNICATION PARAMETERS	
Address	247
Baudrate	19200 bauds
Parity	Even
Stop bits	1 bit
Response timeout	1000 ms



Description



■ BUTTONS

BUTTONS	
REBOOT	Restarts the Modbus adapter with the Holding register's parameters. Note: Switching the power OFF/ON also restarts the Modbus adapter.
CONFIG	Holding the CONFIG button pressed while starting (or restarting) the Modbus adapter starts (or restarts) the adapter with the default communication parameters (cf. previous page). Note: This operation does not change the parameters stored in the Holding register.

■ LEDES

LEDES	
COM	Flashing during a Modbus communication.
ERR	Flashing when a Modbus communication error occurs. Steady when a critical error occurs requiring a restart.
CFG	Flashing when the sensor is in CONFIG mode (started with the CONFIG button pressed).
PWR	Steady when input power OK.
SENS	Steady when output 12 V sensor power OK.



CONNECTORS

SENSOR			
#	Name	Color	Description
1	PWR 12V	White	Power output 12VDC – 300mA
2	PWR GND	Black	Power ground
3	TX	Pink	Serial input 3V3
4	RX	Grey	Serial output 3V3
5	OUT 1	Green	Not connected
6	OUT 2	Yellow	Not connected
7	SDI-12	Blue	Not connected
8	Signal GND	Brown	Not connected

POWER			
#	Name	Color	Description
1	PWR -	Black	Power ground
2	PWR +	Red	Power input 9...36VDC (500mA)

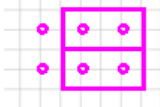
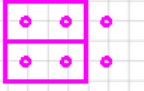
MODBUS 4-WIRE			
#	Name	Color	Description
1	TXD1/TX+/B	Yellow	Output terminal 1, Vb voltage (Vb > Va for binary 1)
2	TXD0/TX-/A	Brown	Output terminal 0, Va voltage (Va > Vb for binary 0)
3	RXD0/RX-/A'	White	Input terminal 0, Va' voltage (Va' > Vb' for binary 0)
4	RXD1/RX+/B'	Blue	Input terminal 1, Vb' voltage (Vb' > Va' for binary 1)
5	COMMON	Grey	Signal ground
6	COMMON	Grey	Signal ground

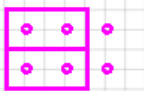
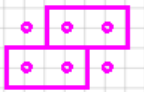
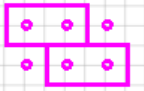
MODBUS 2-WIRE			
#	Name	Color	Description
1	TXD1/TX+/B	Yellow	Transceiver terminal 1, Vb voltage (Vb > Va for binary 1)
2	TXD0/TX-/A	Brown	Transceiver terminal 0, Va voltage (Va > Vb for binary 0)
3	RXD0/RX-/A'	White	Not connected
4	RXD1/RX+/B'	Blue	Not connected
5	COMMON	Grey	Signal ground
6	COMMON	Grey	Signal ground

Note: TXD0-RXD0 and TXD1-RXD1 are connected.

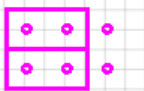
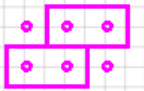
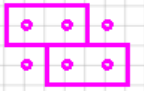


■ JUMPERS

MODE	
Jumper position	Description
	2-WIRE MODE [default] (TXD0-RXD0 et TXD1-RXD1 are connected)
	4-WIRE MODE

TX TERMINATION	
Jumper position	Description
	NO TERM. [default] No termination resistor on TX pair
	120 Ω Standard 120 Ω termination resistor wired on TX pair
	100 Ω 100 Ω termination resistor wired on TX pair

Note: If the ISAW Modbus adapter node is the last one on the bus, the bus TX termination must be wired (in 2-WIRE mode, only on one of the two pairs).

RX TERMINATION	
Jumper position	Description
	NO TERM. [default] No termination resistor on RX pair
	120 Ω Standard 120 Ω termination resistor wired on RX pair
	100 Ω 100 Ω termination resistor wired on RX pair

Note: If the ISAW Modbus adapter node is the last one on the bus, the bus RX termination must be wired (in 2-WIRE mode, only on one of the two pairs).



Modbus function / Register definition

INPUT Registers

The Input registers contain measurements. The content of these registers is updated each time the sensor sends new measurements to the Modbus adapter.

Modbus function:

- READ INPUT REGISTER (0x04)

Address	Type*	Bytes	Offset	Name	Description
0x0000	UINT32	4	0	Counter	Flux/Rain measurement count
0x0002	STRING8	8	2	Unit	Flux/Rain measurement unit ("g/m2/s" or "mm/h")
0x0006	FLOAT	4	6	Min	Flux/Rain measurement minimum
0x0008	FLOAT	4	8	Avg	Flux/Rain measurement average
0x000A	FLOAT	4	10	Max	Flux/Rain measurement maximum
0x000C	FLOAT	4	12	Std	Flux/Rain measurement standard deviation
0x000E	STRING8	8	14	Unit	Flux/Rain measurement cumul unit ("g/m2" or "mm")
0x0012	FLOAT	4	18	Sum	Flux/Rain measurement cumul
0x0014	UINT32	4	20	Counter	Wind measurement count
0x0016	STRING8	8	22	Unit	Wind measurement unit ("km/h")
0x001A	FLOAT	4	26	Min	Wind measurement minimum
0x001C	FLOAT	4	28	Avg	Wind measurement average
0x001E	FLOAT	4	30	Max	Wind measurement maximum
0x0020	UINT32	4	32	Counter	Drop measurement count
0x0022	STRING8	8	34	Unit	Drop measurement unit (« % »)
0x0026	UINT16	2	38	Class 1	Drop distribution of the class
0x0027	UINT16	2	39	Class 2	Drop distribution of the class
0x0028	UINT16	2	40	Class 3	Drop distribution of the class
0x0029	UINT16	2	41	Class 4	Drop distribution of the class
0x002A	UINT16	2	42	Class 5	Drop distribution of the class
0x002B	UINT16	2	43	Class 6	Drop distribution of the class
0x002C	UINT16	2	44	Class 7	Drop distribution of the class
0x002D	UINT16	2	45	Class 8	Drop distribution of the class
0x002E	UINT16	2	46	Class 9	Drop distribution of the class
0x002F	UINT16	2	47	Class 10	Drop distribution of the class
0x0030	UINT16	2	48	Class 11	Drop distribution of the class
0x0031	UINT16	2	49	Class 12	Drop distribution of the class
0x0032	UINT16	2	50	Class 13	Drop distribution of the class
0x0033	UINT16	2	51	Class 14	Drop distribution of the class
0x0034	UINT16	2	52	Class 15	Drop distribution of the class
0x0035	UINT16	2	53	Class 16	Drop distribution of the class
0x0036	UINT16	2	54	Class 17	Drop distribution of the class
0x0037	UINT16	2	55	Class 18	Drop distribution of the class
0x0038	UINT16	2	56	Class 19	Drop distribution of the class
0x0039	UINT16	2	57	Class 20	Drop distribution of the class



Address	Type*	Bytes	Offset	Name	Description
0x003A	UINT16	2	58	Class 21	Drop distribution of the class
0x003B	UINT16	2	59	Class 22	Drop distribution of the class
0x003C	UINT16	2	60	Class 23	Drop distribution of the class
0x003D	UINT16	2	61	Class 24	Drop distribution of the class
0x003E	UINT16	2	62	Class 25	Drop distribution of the class
0x003F	UINT16	2	63	Class 26	Drop distribution of the class
0x0040	UINT16	2	64	Class 27	Drop distribution of the class
0x0041	FLOAT	4	65	Float Test	Fixed value to test float decoding 3,14159265

* **Note:** String are zero-padded.

HOLDING Registers

Holding registers are mainly used to configure the Modbus adapter communication.

Note: Restart the Modbus adapter after changing the configuration.

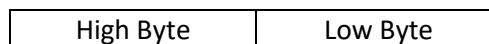
Modbus functions:

- READ HOLDING REGISTERS (0x03)
- WRITE SINGLE REGISTER (0x06)
- WRITE MULTIPLE REGISTERS (0x10)

Address	Type	Bytes	Offset	Name	Values
0x0000	UINT16	2	0	Serial speed	9600, 19200 [default], 38400, 57600, 115200, 128000, 256000
0x0001	UINT16	2	1	Parity	0: No parity, 1: Even [default], 2: Odd
0x0002	UINT16	2	2	Stop Bit	1 [default] or 2 (if no parity)
0x0003	UINT16	2	3	Device address	1 to 247 [default]
0x0004	UINT16	2	4	Response timeout (ms)	Default : 1000

DATA TYPE Format

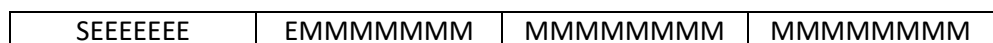
- UINT16 (Big Endian)



- UINT32 (Big Endian)



- FLOAT (IEEE-754)



(S: Sign, E: Exponent, M: Mantissa)

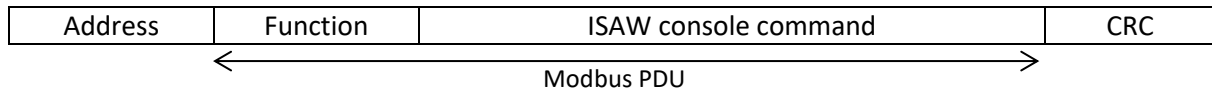


Modbus function PASS-THROUGH (0x64)

This user-defined Modbus function allows to send an ISAW command through the Modbus (see User Guide – Serial communication for more information about the ISAW console commands). For example, use this function with the “set” or “get” ISAW command to access the sensor’s configuration.

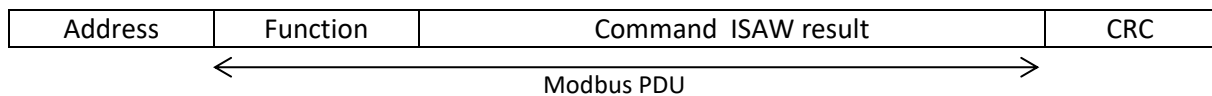
Note: The use of this function is limited by the request and answer lengths.

Request



Field	Size (bytes)	Description
Address	1	Device address (target)
Function	1	0x64
ISAW Command	N	ISAW command as ASCII string
CRC	2	CRC16

Response



Field	Size (bytes)	Description
Address	1	Device address (same as request)
Function	1	0x64
Result	N	ISAW command result as ASCII string
CRC	2	CRC16

Note: The response timeout of this command must be > 2 seconds to allow sensor wake-up.

