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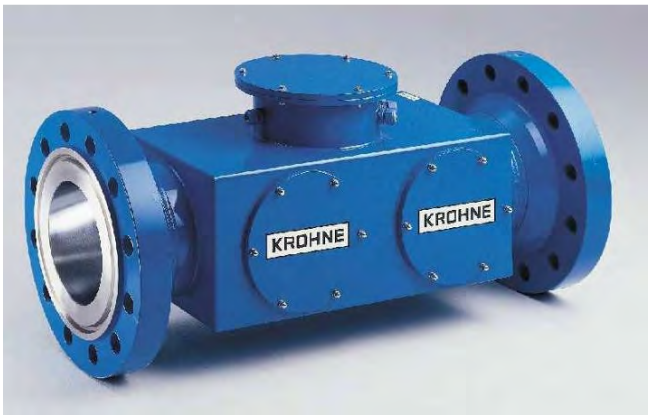
KROHNE

Ultrasonic
Flowmeters

ALTOSONIC V

Reference Guide



Modbus manual

Protocol description
&
setup

Applicable for
software version 0300

TABLE OF CONTENTS

INTRODUCTION

This manual describes how to use the Modbus protocol with the ALTOSONIC V flow meter system.

Product Liability and warranty

Responsibility for suitability and intented use of these ultrasonic flowmeters rests solely with the operator.

Improper installation and operation of the flowmeters (systems) may lead to loss of warranty.

In addition, the “General conditions of sale” forming the basis of the purchase contract are applicable.

1 INTRODUCTION TO MODBUS

From this point in the manual the following abbreviations are used for the ALTOSONIC-V system:
UFS-V: Ultrasonic Flow Sensor (primary flow meter body)
UFC-V: Ultrasonic Flow Converter (5 converters)
UFP-V: Ultrasonic Flow Processor

Introduction to Modbus

For communication with host systems the flow controller emulates a Modbus compatible controller.

The Modbus protocol defines a message structure that controllers will recognise and use, regardless of the type of network over which they communicate. It describes:
- the process a controller uses to request access to other devices,
- how it will respond to requests from the other devices, and
- how errors will be detected and reported.

Controllers communicate using a master-slave principle. Only the master can initiate transactions (requests), and only the addressed device responds. In case of a broadcast request none of the slaves will respond.

The Modbus request consist of:
- an address,
- a function code defining the requested action,
- data (if necessary for the requested function), and
- error check for testing the integrity of the message.

The slave's response contains:
- the slave address,
- data conform the request type, and
- error check.

If the data integrity test fails, no response is sent back.
If a request cannot be processed an exception message is returned.

2 SERIAL TRANSMISSION FORMAT

The two transmission modes used are called:
1. ASCII, and
2. RTU.

The user has to select the desired mode along with the serial communication parameters (baud rate, parity-type).

Note that all these parameters must be the same for all controllers in the network.

2.1 ASCII-mode

- Each byte of the message is sent as two ASCII characters.
  This means only the ASCII characters 0-9, A-F are transmitted.
- Serial communication parameters:
  1 start byte, 7 data bits, even/odd/no parity, 1 stop bit if parity is used and two stop bits if no parity is used.
- Error check field:
  Longitudinal Redundancy Check (LRC).

The advantage of ASCII mode is that it allows for a time interval up to 1 second between characters without causing a timeout.
A disadvantage of ASCII mode is the larger message length.

2.2 RTU-mode

- Each byte of the message is sent as 8 bits.
- Serial communication parameters:
  1 start byte, 8 data bits, even/odd/no parity, 1 stop bit if parity is used, and two stop bits if no parity is used.
- Error check field:
  Cyclic Redundancy Check (CRC).

3 MODBUS MESSAGE FRAMING

ASCII-mode
In ASCII-mode a message starts with a colon character (:) and ends with a carriage return–linefeed. Intervals up to one second can elapse between characters within the message. If the interval is longer, a timeout error occurs and the message is rejected.

RTU mode
In RTU-mode a message starts with a silent interval of at least 3.5 character times. The entire message frame must be transmitted as a continuous stream. If a silent interval of more than 3.5 character times occurs before completion of the frame, the receiving device flushes the incoming message and assumes that the next byte will be the address field for the new message.
- See 9.1 Appendix A for the applied timeout values.

Example of a typical message frame:

	START	ADDRESS	FUNCTION	DATA	DATA CHECK	END
ASCII Mode	':'	2 characters	2 characters	N*2 characters	LRC 2 characters	CR-LF
RTU Mode	3.5 characters silent interval	8 bits	8 bits	N*8 bits	CRC 16 bits	3.5 character silent interval

3.1 The Address Field

The address field of a message frame contains:
- 2 characters (ASCII-mode) or
- 8 bits (RTU-mode).

Valid slave addresses are 1 to 247.
Address 0 is used for a broadcast to address all slaves.

3.2 The Function Field

The function field of a message frame contains:
- 2 characters (ASCII-mode) or
- 8 bits (RTU-mode).

Valid codes lie in a range of 1 to 127.

The function code tells the slave which kind of action to perform.
The supported functions are listed in chapter 5.
A slave response always contains the function code of the request. If a function is not applicable, the slave sends an exception response. An exception is indicated by a returned function code with bit 8 (most significant byte) set.

3.3 The Data Field

The data field contains 8 bit values in the range of 0 to FF hexadecimal.

In ASCII mode this byte is made of 2 ASCII characters.

The data field of messages contains information which both master and slave use to perform an action. This includes the register address, quantity of registers, and the necessary data.

3.4 The Error Checking Field

The error checking field contents depend on the transmission mode.
Two kinds of error methods are used.

Error check with ASCII-mode
When the ASCII mode is used, the error-checking field contains two ASCII characters.
The error check characters are the result of a Longitudinal Redundancy Check calculation. This is performed on the message contents with exception of the beginning colon, the carriage return and line feed characters.
The LRC characters are appended to the message as the last field preceding the CR-LF characters.

- See 9.2 Appendix B for more information about the Longitudinal Redundancy Check.

Error check with RTU-mode
When RTU mode is used, the error-checking field contains a 16-bit value implemented as two bytes.
The error check value is the result of a Cyclic Redundancy Check calculation performed on the message contents.
The CRC field is appended to the message as the last field.

- See 9.3 Appendix C for more information about the Cyclic Redundancy Check.

3.5 Other Error Checking Methods

Standard Modbus uses two kinds of error checking methods:

1. Character based check
   an additional parity bit for each character (even or odd parity).
2. Message based check
   an additional error check calculated over the entire message.

Both character check and message check are generated in the transmitting device and applied to the message before transmission.
The slave checks each character and the entire message frame during receipt.

The master has a predetermined timeout interval before aborting the transaction. This interval is set long enough for any slave to respond normally.
The timeout interval is set by the parameter ***7.2 REQUEST_TO_RESPONSE_TIMEOUT***.

ASCII mode
In ASCII mode the maximum time between 2 characters is one second. If a longer interval occurs, the message will be rejected and the search for a starting character (colon) is resumed.

RTU mode
In RTU mode the entire message frame must be transmitted as a continuous stream. If a silent interval of more than 3.5 character times occurs before completion of the frame, the receiving device flushes the incoming message and assumes that the next byte will be the address field for the new message.

4 PHYSICAL COMMUNICATION LAYER

The Modbus protocol is a half-duplex protocol. The physical layer can be half or full duplex.
The Modbus driver supports both half (RS485) and full (RS232/RS422) duplex communication layers.

In case of RS485, the parameter ***3.8 MODBUS_UART_HALF_DUPLEX*** must be turned on. The transmitter is activated when the UFP-V transmits data.
The RS485 receiver may **not be disabled** e.g. the transmitted data must also be received by the UFP-V for correct functioning!

4.1 When using RS232 to RS485 converters

- Always use isolated converters!
- Use the types that enable the transmitter by means of the **Request To Send signal**.
- Use the parameter ***3.4 MODBUS_UART_RTS_MODE*** to define whether a *high* or a *low* level enables the transmitter.
- Check if the terminator resistor corresponds with the characteristic line impedance.
- Use pull-up and pull down resistors for fail safe operation.
- If possible, use the Serial Communication port that uses Interrupt Request 3.

4.2 When using serial I/O cards with RS485 drivers

- Use the types that enable the transmitter by means of the **Request To Send signal.**
- Use the parameter ***3.4 MODBUS_UART_RTS_MODE*** to define whether a *high* or a *low* level enables the transmitter.
- Check if the terminator resistor corresponds with the characteristic line impedance.
- Use pull-up and pull down resistors for fail safe operation.
- Set the IO-address and Interrupt number to the correct values.
- When possible, use Interrupt Request 3.

5 SUPPORTED FUNCTIONS

All data addresses in Modbus messages are referenced to zero.
For example:

- Coil 1 is addressed as Coil 0000.
- Holding register 40001 is addressed as 0000. Note that the function code specifies the operation of a 'holding register', therefore the 4xxxx reference is implicit.

When functions which do not support broadcast requests, are accessed with a broadcast address, the request will be rejected.

5.1 Function 01: READ COIL STATUS

Description
Function 1 reads the ON/OFF status of discrete inputs or discrete variables in the slave (0 x references called coils).
Broadcast is not supported.

Query
The query specifies the starting coil and the quantity of coils to read.
The maximum number of coils requested each request is limited to 2000.

Example
Here is an example of a request to read coils 20-56 from slave device 17:

Header	Slave Address	Function	Starting address		Number of points		Error check	Trailer
--	11(h)	01(h)	Hi 00(h)	Low 13(h)	Hi 00(h)	Low 25(h)	--	--

Response

Header	Slave address	Function	Byte count	Data					Error check	Trailer
				Coil 27-20	Coil 35-28	Coil 43-36	Coil 51-44	Coil 56-52		
--	11(h)	01(h)	05(h)	CD(h)	6B(h)	B2(h)	0E(h)	1B(h)	--	--

The coil status in the response message is packed as one coil per bit of the data field. Status is indicated as 1= ON, 0= OFF.
The LSB of the first data byte contains the coil addressed in the query. The other coils follow toward the high order end of this byte and from 'low order to high order' in subsequent bytes.

If the returned coil quantity is not a multiple of eight, the remaining bits in the final data byte will be padded with zeros (toward the high order end of the byte). The Byte Count field specifies the quantity of complete bytes of data.

The status of coils 27-20 is shown as the byte value CD hex, or binary 1100 1101.
Coil 27 is the MSB of this byte, and coil 20 is the LSB. Left to right, the status of coils 27 through 20 is ON-ON-OFF-OFF-ON-ON-OFF-ON.

By convention, bits within a byte are shown with the MSB to the left, and the LSB to the right. Thus the coils in the first byte are '27 through 20', from left to right, The next byte has coils '35 through 28', left to right. As the bits are transmitted serially, they flow from LSB to MSB: 20…27, 28...35, and so on.

In the last data byte, the status of coils 56-52 is shown as the byte value 1B hex, or binary 0001 1011.
Coil 56 is in the fourth bit position from the left, and coil 52 is the LSB of this byte. The status of coils 56 through 52 is ON-ON-OFF-ON-ON.

Note how the three remaining bits (toward the high order end) are zero-filled.

If the request is not applicable an exception response will be sent.
- See chapter 5.10 for exception responses.

5.2 Function 02: READ INPUT STATUS

In the UFP-V Modbus protocol, function 1 and 2 perform the same processing and are interchangeable.

5.3 Function 03: READ MULTIPLE HOLDING REGISTERS

Description
Function 3 reads the binary contents of holding registers (4X references) in the slave.
Broadcast is not supported.
The maximum number of registers at each request is limited to 125 registers, 125 integers, or 62 long integers or 62 floats or 31 doubles.

Query
The query message specifies the starting register and the quantity of registers to be read. Registers are addressed starting at zero. Registers 1-16 are addressed as 0-15.

Example
Here is an example of a request to read registers 40108-40110 from slave device 17:

Header	Slave Address	Function	Starting address		Number of points		Error check	Trailer
			Hi	Low	Hi	Low		
--	11(h)	03(h)	00(h)	6B(h)	00(h)	03(h)	--	--

Response

Header	Slave address	Funct.	Byte count	Data						Error check	Trailer
				Reg. 40108 Hi	Reg. 40108 Low	Reg. 40109 Hi	Reg. 40109 Low	Reg. 40110 Hi	Reg. 40110 Low		
--	11(h)	03(h)	06(h)	02(h)	2B(h)	00(h)	00(h)	00(h)	64(h)	--	--

The register data in the response message are packed as two bytes per register, with the binary contents right justified within each byte. For each register the first byte contains the high order byte, the second the low order bits.

The contents of register 40108 are shown as the two byte values of 02 2B hex (555 decimal).
The contents of register 40109 are 00 00 hex and of register 40110 00 64 hex (100 decimal).

If the request is not applicable an exception response will be sent.
- See chapter 5.10 for exception responses.

5.4 Function 04: READ INPUT REGISTERS

In the UFP-V Modbus protocol, function 3 and 4 perform the same processing and are interchangeable.

5.5 Function 05: WRITE SINGLE COIL

Description
Function 5 forces a single coil to either ON or OFF (0x reference).
When the address is a broadcast, all slaves will process the request.

Query
The query message specifies the coil reference to be forced. Coils are addressed starting at zero (coil 1 is addressed as zero).

The requested ON/OFF status is specified by a constant in the query data field. A value of *FF 00* hex requests the coil to be ON. A value of 00 00 requests it to be OFF. All other values are illegal and do not affect the coil and generate an exception.

Example
Here is an example of a request to force coil 173 ON in slave device 17.

Header	Slave Address	Function	Coil Address		Data		Error Check	Trailer
			Hi	Low	Hi	Low		
--	11(h)	05(h)	00(h)	AC(h)	FF(h)	00(h)	--	--

The normal response is an echo of the query, returned after the coils state has been forced.

Header	Slave Address	Function	Coil Address		Data		Error Check	Trailer
			Hi	Low	Hi	Low		
--	11(h)	05(h)	00(h)	AC(h)	FF(h)	00(h)	--	--

If the request is not applicable an exception response will be sent.
- See chapter 5.10 for exception responses.

5.6 Function 06: WRITE SINGLE HOLDING REGISTER

Description
Function 6 pre-sets a value into a single holding register (4x reference).
When the address is a broadcast, all slaves will process the request.

Query
The query specifies the register reference to be preset. Registers are starting at address zero.
The requested value (preset) is specified in the query data field, which is a 16-bit value.

Example
Here is an example of a request to preset register 40002 to *00 03* in slave 17.

Header	Slave Address	Function	Register Address		Data		Error Check	Trailer
			Hi	Low	Hi	Low		
--	11(h)	06(h)	00(h)	01(h)	00(h)	03(h)	--	--

Response is an echo of the query, returned after the register contents have been pre-set.

Header	Slave Address	Function	Register Address		Data		Error Check	Trailer
			Hi	Low	Hi	Low		
--	11(h)	06(h)	00(h)	01(h)	00(h)	03(h)	--	--

If the request is not applicable an exception response will be sent.
- See chapter 5.10 for exception responses.

5.7 Function 8: DIAGNOSTICS

Description
Function 8 provides a test for checking the communication system between the master and the slave.

Query
The function uses a two-byte sub-function field in the query to define the test to be performed.

Header	Slave address	Function	Sub-function	Data Hi+Lo	Error check	Trailer
--	11(h)	08(h)	00 00(h)	A1B8 (h)	--	--

Only sub-function 0 is supported, which response is to loop back the query data.
Function 8 is only supported in slave mode.

5.8 Function 15: WRITE MULTIPLE COILS

Description
Function 15 forces each coil (0x reference) in a sequence of coils to either ON or OFF.
When the address is a broadcast, all slaves will process the request.

Query
The query message specifies the coil reference to be forced. Coils are addressed starting at zero (coil 1 is addressed as 0).

Example
Here is an example of a request to force a series of coils starting at coil 20 in slave 17. The query data contents are two bytes *CD 01* hex, the binary bits correspond to the coils in the following way:

Bit	1	1	0	0	1	1	0	1	0	0	0	0	0	0	0	1
Coil	27	26	25	24	23	22	21	20	x	x	x	x	x	x	29	28

X means don't care and are made zero.

The first byte transmitted (*CD*) addressed coils 27…20, where by the least significant bit addresses the lowest coil (*20*) in this set.

The next byte transmitted (*01*) addresses coils 29 and 28, with the least significant bit addressing the lowest coil (*28*) in this set. Unused bits in the last data byte should be left zero.

Request:

Header	Slave Address	Function	Coil address		Quantity Of points		Byte counts	Force data		Error check	Trailer
			Hi	Low	Hi	Low		Hi	Low		
--	11(h)	0F(h)	00(h)	13(h)	00(h)	0A(h)	02(h)	CD(h)	01(h)	--	--

Response
The normal response returns the slave address, function code, starting address, and quantity of coils forced.

Header	Slave Address	Function	Coil Address		Quantity Of points		Error check	Trailer
			Hi	Low	Hi	Low		
--	11(h)	0F(h)	00(h)	13(h)	00(h)	0A(h)	--	--

If the request is not applicable an exception response will be sent.
- See chapter 5.10 for exception responses.

5.9 Function 16: WRITE MULTIPLE HOLDING REGISTERS

Description
Function 16 pre-sets values into a sequence of holding registers (4x reference).
When the address is a broadcast, the function pre-sets the same register references in all attached slaves.

Query
The query message specifies the register references to be pre-set. Registers are addressed starting at zero (register 1 is addressed as 0).

Example
Here is an example of a request to pre-set two registers starting at 40002 to *00 0A* end *01 02* hex, in slave device 17.

Header	Slave Address	Funct.	Starting address		Quantity Registers		Byte counts	Data				Error check	Trailer
			Hi	Low	Hi	Low		Hi	Low	Hi	Low		
--	11(h)	10(h)	00(h)	01(h)	00(h)	02(h)	04(h)	00(h)	0A(h)	01(h)	02(h)	--	--

Response
The normal response returns the slave address, the function code, starting address, and quantity of registers pre-set.

Header	Slave Address	Function	Starting Address		Quantity Of points		Error check	Trailer
			Hi	Low	Hi	Low		
--	11(h)	10(h)	00(h)	01(h)	00(h)	02(h)	--	--

If the request is not applicable an exception response will be sent.
- See chapter 5.10 for exception responses.

5.10 Exception Responses

Except for broadcast messages, a master device expects a normal response, when it sends a query to a slave device.

One of the four possible events can occur from the master's query:

1. If the slave device receives the query without a communication error and can handle the query normally, it returns a normal response.
2. If the slave does not receive the query due to a communication error, no response is returned. The master program will eventually process a timeout condition for the query.
3. If the slave receives the query, but detects a communication error (parity, CRC, LRC), no response is returned. The master program will eventually process a timeout condition for the query.
4. If the slave receives the query without a communication error, but cannot handle it, the slave will return an exception response informing the master of the nature of the error.

The exception response message has two fields that differentiate it from a normal response:

1 the function code field; and
2 the data field.

Ad 1 Function Code Field

In a normal response the slave echoes the function code of the original query in the function code field of the response. All function codes have a most significant bit of 0.
In an exception response the slave sets the most significant bit of the function code to 1.
The master recognises the exception response by means of this bit and can examine the data field for the exception code.

Ad 2 Data field

In an exception response the slave returns an exception code in the data field.
This defines the slave condition that caused the exception.

The exception response message:

Header	Slave address	Function	Exception code	Error check	Trailer

Exception codes

Code	Name	Meaning
01	Illegal function	The function code in the query is not an allowable action for the slave.
02	Illegal data address	The data address received in the query is not an allowable address for the slave.

6 HANDLING OF LARGE DATA TYPES

The standard Modbus specification does not explain how data types larger than 16 bits should be handled. The standard Modbus functions to modify holding registers are used for handling larger data types.

Function 03 (read multiple holding registers), function 06 (write single holding register), and function 16 (write multiple holding registers) are used to read or modify these data types.

In the UFP-V each register-area contains a data type.

In order to maintain compatibility with older systems, a parameter ***5.2 MODBUS_MODICON_COMPAT*** controls how the registers are counted.
In modicon compatible mode the data is counted as 16 bit registers.
In not-modicon compatible mode the data is counted on the data type, so a float is one register!

Notice that function 6 in not-modicon compatible mode will also write one type of the accompanying data type!

The supported data types are:

- Boolean
- Integer (16 bit)
- Long integer (32 bit)
- Float (32 bit)
- ASCII 8 characters (64 bit)
- Double (64 bit)
- ASCII 16 characters (128 bit)

The register ranges for each data type:

Function	Address (default)	Data type	Number of registers to request for each data type	
			Modicon compatible	Not Modicon compatible
1,2,5,15	1000..2999	Boolean	1	1
3,4,6,16	3000..3999	Integer	1	1
	5000..5999	Long integer	2	1
	6000..6999	Double	4	1
	7000..7999	Float	2	1
3,16, 65, 66	4000..4999	ASCII (8 char)	4	1
	14000..14999	ASCII (16 char)	8	1

Notice that in *modicon compatible mode* each data type larger than 16 bits should be addressed as 16 bit registers. For instance the first float is located on address 7000/7001 the next float is located on address 7002/7003.

A double would be accessed by four 16-bit registers, so the first double 6000/6001/6002/6003 and the next double 6004/6005/6006/6007.

The data in the chapter 8.4 Modbus Mapping Assignments is printed as it should be accessed in *not-modicon compatible* mode and *modicon compatible* mode.

6.1 Floating Point Representation

The exponent is biased by 127.
The mantissa is 24 bits with the most significant bit 1 (not stored), 23 bit stored.

Biased exponent	Mantissa 3 (high)	Mantissa 2	Mantissa 1 (low)
SEEE EEEE	E MMM MMMM	MMMM MMMM	MMMM MMMM

6.2 Double Representation

The exponent is biased by 1023.
The mantissa is 53 bits with the most significant bit 1 (not stored), 52 bits stored.

Biased exponent	Exp+Mantissa	Mantissa 6	Mantissa 5
SEEE EEEE	EEEE MMMM	MMMM MMMM	MMMM MMMM

Mantissa 4	Mantissa 3	Mantissa 2	Mantissa 1
MMMM MMMM	MMMM MMMM	MMMM MMMM	MMMM MMMM

6.3 Transmit Sequence

Integers are transmitted and stored with the most significant part first.
Example
Integer value 1790 decimal (6FE hexadecimal) is transmitted as:

First transmitted byte in data field	Second transmitted byte in data field
06	FE

Long integers could be transmitted in two possible ways:
Example
Long integer value 305419896 (12345678 hexadecimal)
The transmit order in both modes:

Normal mode	(1) 12_h	(2) 34_h	(3) 56_h	(4) 78_h
Reversed mode	(3) 56_h	(4) 78_h	(1) 12_h	(2) 34_h

Floats could be transmitted in two ways:

Example:

The float number 4.125977 will give the IEEE representation.

S	EXPONENT	MANTISSA
0	1000 0001	(1) 000 0100 0000 1000 0000 0000

- A biased exponent of 129 (81 hexadecimal) is exponent 2.
- A positive sign
- Mantissa = 4 + 1/8 + 1/1024. Note that the first bit is not stored!

The transmit order in both modes:

IEEE	(1) 40_h	(2) 84_h	(3) 08_h	(4) 00_h
Normal mode	(1) 40_h	(2) 84_h	(3) 08_h	(4) 00_h
Reversed mode	(3) 08_h	(4) 00_h	(1) 40_h	(2) 84_h

Doubles could be transmitted in two ways:
Example
The double number 4.125000001862645 will give the IEEE representation.

S	EXPONENT	MANTISSA
0	100 0000 0001	(1)0000 1000 0000 0000 0000 0000 0000 0010 0000 0000 0000 0000 0000

- A biased exponent of 1025 (401 hexadecimal) is exp. 2
- A positive sign
- Mantissa = 4 + 1/8 + 1/536870912. Note that the first bit is not stored!

The transmit order in both modes:

IEEE	(1) 40_h	(2) 10_h	(3) 80_h	(4) 00_h	(5) 00_h	(6) 20_h	(7) 00_h	(8) 00_h
Normal mode	(1) 40_h	(2) 10_h	(3) 80_h	(4) 00_h	(5) 00_h	(6) 20_h	(7) 00_h	(8) 00_h
Reversed mode	(3) 80_h	(4) 00_h	(1) 40_h	(2) 10_h	(7) 00_h	(8) 00_h	(5) 00_h	(6) 20_h

6.4 Maximum requested points

The maximum points in a single request depend on the type of data.

Data type	Modicon compatible mode (count on 16 bit registers)	Not Modicon compatible mode (count on type)
Boolean	2000	2000
Integer	125	125
Long integer	124	62
Float	124	62
ASCII	124	62(8chars) 31(16 chars)
Double	124	31

How to set up a redundant system
Two or more UFP-V systems
If one or more UFP-V systems are used with one host system, the host system must support Modbus master mode. The UFP-V will then operate in Modbus slave mode.

Two or more host systems
As a result of operational safety, some applications require more than 1 host-system communicating with one UFP-V.

If the UFP-V is used in slave mode, only one host-master may be connected.

One solution is to use the UFP-V as a Modbus master. Now the data is sent to the first addressed host (first poll block), the second poll block sends the data to the next host.
The data could be different, because the measured data is updated.

Another solution is to send the data to the hosts by means of a broadcast. Now all host systems receive the same data.

7 SET-UP OF THE UFP-V MODBUS DRIVER

7.1 Driver Contents

The driver contains:

- Standard Modbus protocol according to Modicon.
- Simulation of Modbus Master and Slave mode.
- ASCII-mode and RTU mode.
- Half and full duplex communication layers supported.
- Transmitter ON/OFF level select for half-duplex mode.
- Seven or eight data bits, Even/Odd/No parity, 1 or 2 stop bits
- Extended data type support.
- Function 1, 2, 3, 4, 5, 6, 8,15,16 including exception generation.

7.2 Hardware set-up

To set up the Modbus communication first the **hardware** should be set-up.

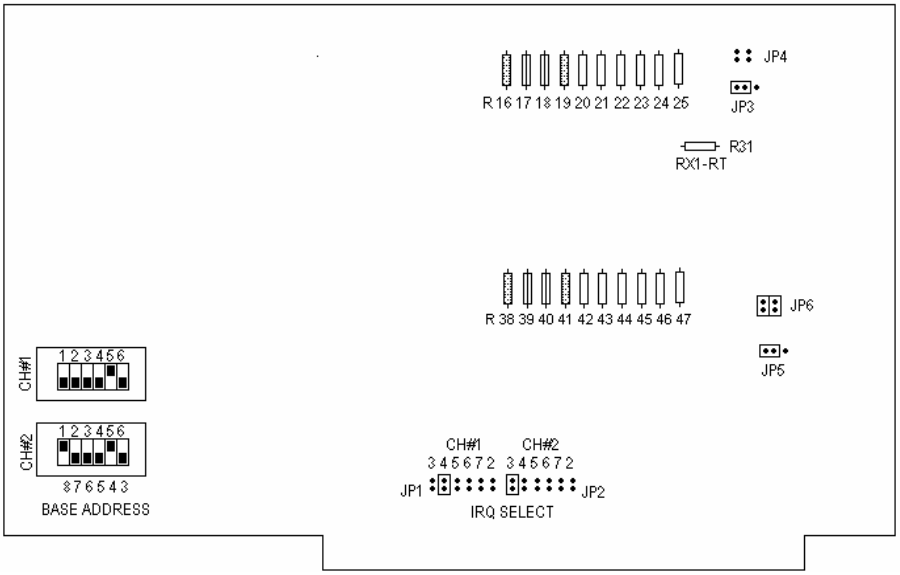
The UFP is equipped with a RS485/RS422 Communication Card which provide 2 serial communication channels, the first channel CH1 is used for the communication with the UFC-V, please do not change anything here. The second channel CH2 is free for communication with host systems .

There are two generations of RS485 cards:

- AX4285A formerly installed
- PCL745s currently installed

7.2.1 RS485/422 card: AX4285A

The first generation of RS 485 cards used



DIP SWITCH CH1***	: COM 3 Baseaddress ch#1: 3E8
DIP SWITCH CH2***	: COM 4 Baseaddress ch#2: 2E8
JP1***	: COM3 Interrupt IRQ4
JP2***	: COM4 Interrupt IRQ3
JP3***	: COM3 RS 485 mode
JP4***	: COM3 Serial resistors enabled, No jumpers installed
JP5	: COM4 RS 485 mode as default
JP6	: COM4 Serial resistors not enabled, jumpers installed

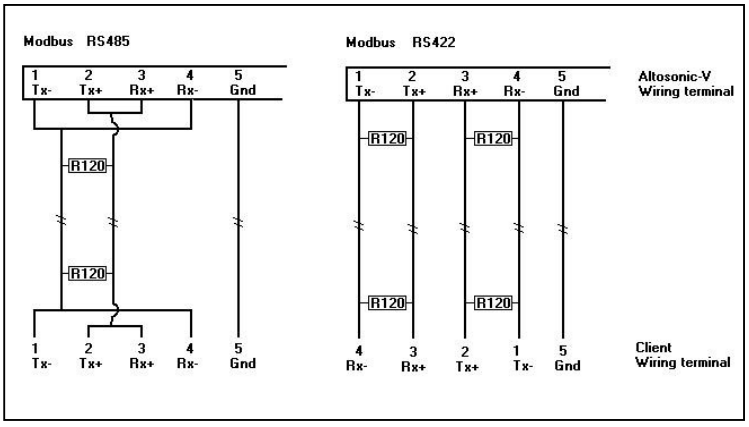
***(=Krohne Altometer setting)

NOTE:

RS485 mode and RS422 mode for COM4 (Modbus) differs in set-up by:

- Jumper JP5 RS485 or RS422
- The external wiring for RS422 and RS485

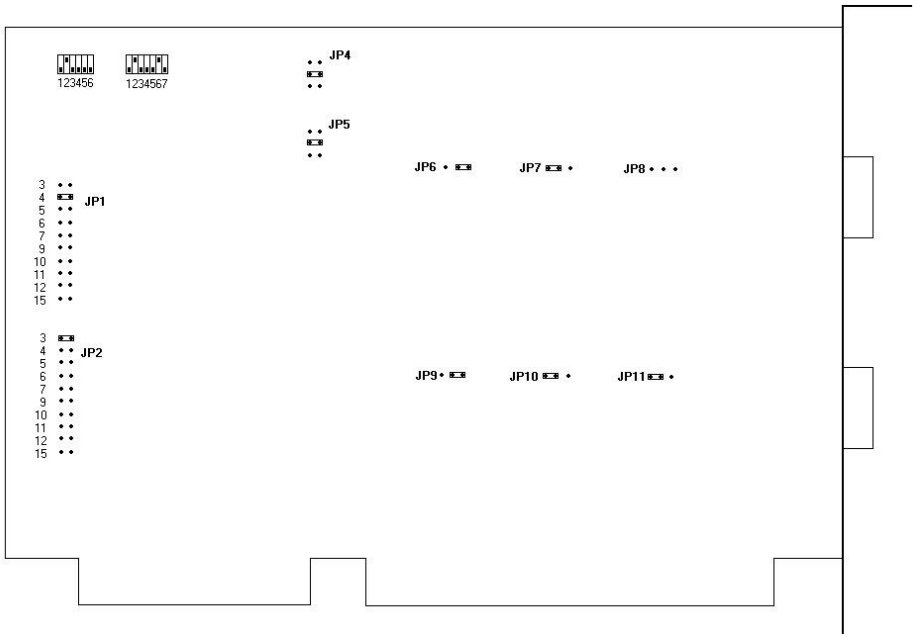
External wiring AX5285A for Modbus:



The resistors of 120 Ohm must be placed at the Altosonic-V wiring terminal

7.2.2 RS485/422 card: PCL-745 S

The current generation RS485/422 card



Dip switch ch1***	: COM 3 Address 3E8 (Krohne Altometer setting)
Dip switch ch2***	: COM4 Address 2E8
JP1***	: Interrupt COM3 IRQ4
JP2***	: Interrupt COM4 IRQ3
JP4***	: Transmit driver enable COM3 always RTS
JP5	: Transmit driver enable COM4 default RTS
JP6***	: Receive COM3 (422 is always on)
JP7***	: Terminator jumper COM3 120
JP8***	: Terminator jumper COM3 always not installed
JP9***	: Receive COM4 (422 is always on)
JP10***	: Terminator jumper COM4 120
JP11	: Terminator jumper COM4 (120 for RS422 mode, not installed for RS485 mode)

***(=Krohne Altometer setting)

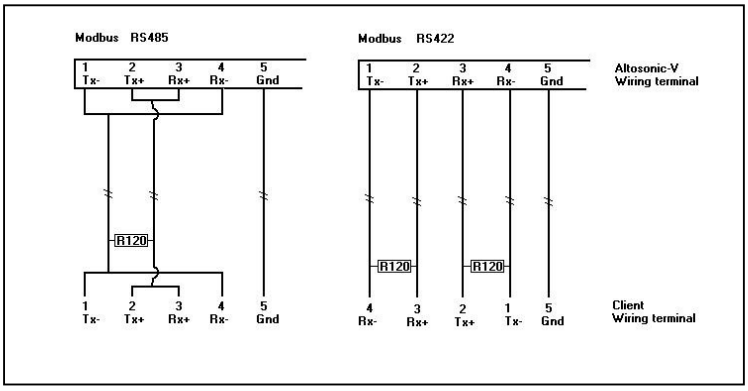
NOTE:

JP6 and JP9 are always 422 because the receiver is for both RS485 mode and RS422 mode expected to be enabled for the UFP-Program.

RS485 mode and RS422 mode for COM4 (Modbus) therefore only differs in set up by:

- Jumper JP11 not installed (RS485) or installed on 120 (RS422)
- The external wiring for RS422 and RS485

External wiring PCL745 for Modbus:



7.3 Software set-up

Now set-up the software, all the settings for the Modbus driver is done in the file [coms0300.dat].
See also chapter 9.4 Appendix D: Coms0300.dat file

7.3.1 First set the parameters for the communication line

- ***3.1 MODBUS_UART_BASEADRESS*** for channel 1 is COM4 this is baseaddress **0x2E8**
- ***3.2 MODBUS_UART_INTERRUPT*** is for COM4 set to interrupt **3**.
- Depends on your application : ***3.3 MODBUS_UART_BAUDRATE*** **1200,2400,4800,9600,19200**
- ***3.4 MODBUS_UART_RTS_MODE*** to **0**.
- Depends on your application : ***3.5 MODBUS_UART_N_DATABITS*** to **7 or 8**
- Depends on your application : ***3.6 MODBUS_UART_N_STOPBITS*** to **1 or 2**
- Depends on your application : ***3.7 MODBUS_UART_PARITY*** **to none, even or odd**.
- Depends on your application : ***3.3 MODBUS_UART_BAUDRATE*** **1200,2400,4800,9600,19200**
- Depends on your application :
  If you use **RS485** set ***3.8 MODBUS_UART_HALF_DUPLEX*** to **HALF_DUPLEX**(=1)
  If you use **RS422** set ***3.8 MODBUS_UART_HALF_DUPLEX*** to **FULL_DUPLEX**(=0)

7.3.2 Now select the parameters for the used protocol

- Select the frame type **RTU** or **ASCII** with ***3.9 MODBUS_TRANSFER_MODE***.
- Set the UFP-V as **MASTER** or **SLAVE** device with ***5.1 MODBUS_DEVICE_TYPE***.
- Select if variables, which are larger than 16 bits are still counted as the number of 16 bit
- Set the data points requesting type by parameter ***5.2 MODBUS_MODICON_COMPAT***:
  By type is **not modicon compitable (=0)**
  By 16 bit registers is **modicon compitable (=1)**

-

7.3.3 The UFP-V as SLAVE device

The slave mode is activated when the parameter ***5.1 MODBUS_DEVICE_TYPE***=1.

- If the UFP-V acts like a **Modbus Slave device**, set the SlaveID with ***5.3 MODBUS_SLAVE_ID***.
- The ***5.4 FLAG_HOLD_TIME*** is a hold time on the status flags (Booleans only).
  The ***5.4 FLAG_HOLD_TIME*** freezes the flags after the flag has changed from state.
  Set this time a bit larger than the maximum communication-request interval.
- The next fields define to which Modbus addresses the data of the UFP-V is mapped to, these settings are default settings and should not be changed, only if necessary.
  The fields are ***6 DATAFIELD*** **1 to N**, for every DATAFIELD an access mode could be set.
  The ***6 ACCES MODE*** defines how the data is send and interpreted when the UFP-V is in **slave-mode**.
- See the manual of the accompanying byte-order of transmission/reception with the 2 modes.

For Slave-use the driver should be working now.

7.3.4 The UFP-V as Master

The master mode is activated when the parameter ***5.1 MODBUS_DEVICE_TYPE**=2*.
For **master mode** the UFP-V must know what it should send to the connected slave device, therefore the master works with **poll blocks.** Each poll block defines how a transaction should take place i.e. which slave is addressed, which registers are read or write and how to do it.

The maximum number of poll blocks to define is 20. The number of poll blocks to use is set with the parameter ***7.1 NUMBER_OF_POLLBLOCKS_TO_USE***.
During start-up of the UFP-V, a poll block validation check will be done. Only the number of poll blocks defined in ***7.1 NUMBER_OF_POLLBLOCKS_TO_USE*** will be checked.
The maximum response time after a poll block request is set by the parameter
7.2** R**EQUEST_TO_RESPONSE_TIMEOUT.
If no response is received from the slave within this time, a poll block timeout error is generated.

So for every pollblock (=data movement) set :

- The ***7.3a SLAVEID*** : the address of the slave device , notice that 0 is a broadcast to all slaves, not all the functions are allowed with broadcast messages.
- The ***7.3b MASTER REGISTER***, this is the location of the data in the UFP-V.
- The ***7.3c SLAVE REGISTER***, this is the location of the data in the slave device.
- The ***7.3d N_POINTS***, this is always the number data points of the specific datatype to transfer, like 1 Boolean, 1 int, 1 float. The real number of 16 bit registers in the Modbus message is **calculated**. For instance, in modicon compatible mode the number of registers in the **message** is always 2 times the number of floats.
  In not-modicon compatible mode the number of registers in the **message** is always the same as number of floats. So **number of points** in the pollblock definition always count the **datatypes**.
- The ***7.3e FUNCTION*** selects which Modbus function is used for the data transfer (see a complete list in the manual).
- The ***7.3f DATATYPE*** is for internal validation only but should be filled in correctly.
- The ***7.3g DATANOTATION*** defines in which byte-order the data is send, float, longs, doubles may be send with different notations (like big and little indian).
- The ***7.3h DELAY*** is the time to wait after the last pollblock has been send before sending the next pollblock. When all the pollblocks are defined, select with
  7.1 NUMBER_OF_POLLBLOCKS_TO_USE, which pollblocks to use. 1=first one only, 2 is number one and two …and so on.

7.4 What can go wrong?

When using RS485, check:
- Are the connections between terminal 1 and 4 made?
- Are the connections between terminal 2 and 3 made?
- Is the terminate resistor placed between 1+4 and 2+3 (only if UFP-V is the end of the line).
- Is the jumper set to 485 and not 422? (else the transmitter will continuously be activated and destroy received messages)
- Is the polarity correct? Are the lines by accident swapped?
- Is the software set to Half Duplex (***3.8 MODBUS_UART_HALF_DUPLEX***=1)

When using RS422, check:
- Are both terminator resistors placed at the end of the cable on the TX+, TX- and RX+, RX- lines?
- Is the jumper on the RS485 card set to 422?
- Is the software set to Full duplex ((***3.8 MODBUS_UART_HALF_DUPLEX***=0)?

Other checks:
- Are the following items correct:
  baud rate (***3.3 MODBUS_UART_BAUDRATE***)
  N stop bits (***3.6 MODBUS_UART_N_STOPBITS***)
  parity (***3.7 MODBUS_UART_PARITY***)
- Are both systems in the same mode **RTU**/**ASCII** (ASV system = **3.9 MODBUS_TRANSFER_MODE)**?
- Is the Slave ID (***5.3 MODBUS_SLAVE_ID***) correct?
- Notice that RTU requires precise timing specifications, some of the RS485 -> RS232/422 converters perform data buffering and may give problems.
  If this is the problem try the ASCII mode (***3.9 MODBUS_TRANSFER_MODE***).
- Notice that the Slave device will not give any response when it is addressed with a broadcast (SlaveID=0).

Extra information:
The UFP-V has extra windows, which provide information about the Modbus communication:
These windows are accessed from the Main Window by function key F10
See also Altosonic-V Operating Manual (chapter RUNTIME WINDOWS)

7.5 How Status Flags are Updated

If the status flags must be self-resetting

Each machine cycle (35 ms) all the error and warning flags are updated with the last machine status.
An active flag will be pending for at least (***5.4 FLAG_HOLD_TIME*** * 35) ms.
An Active Flag may be reset earlier (by writing a zero) than the pending time (***5.4 FLAG_HOLD_TIME*** * 35 ms), but the next update will be after the pending time.

If the flags must be acknowledged
To activate this mode, the parameter ***5.4 FLAG_HOLD_TIME*** must be set to 0. Each machine cycle (35 ms) all warning and error flags are updated with the last machine status.
The flags can be reset by:
- writing a 0 to these flags or
- writing a 1 to the accompanying acknowledge flag (each status flag has an accompanying acknowledge flag) or
- writing a 1 to the acknowledge_all flag
  (for host computers with limited free programmable Boolean space).

Example of reading a status flag from an UFP-V in slave mode
The status flag is read by the master.

1. **If the status flag is active**,
   the master uses this state to perform its actions and sends an acknowledgement to the UFP-V by setting the accompanying ACK_flag to 1.
   Now the UFP-V updates the status flag with the actual status.
   Note that in this mode the status flag remains active until the acknowledge is given.
2. **If the status flag is not active**,
   the master removes the acknowledge by resetting the ACK_flag.

Example of reading status flag 0 from an UFP-V in master mode

1. The first poll block sends the status flag to the master
2. **If the status flag is active**, the master uses this status to perform his actions and sends an acknowledgement to UFP-V by means of setting the accompanying ACK_flag to 1.
3. The next poll block reads this ACK_FLAG and updates it in the UFP-V,
   now the UFP-V updates the status flag with the actual status.
3. **If the flag is not active**, the master removes the acknowledgement by resetting the ACK_flag.

As long as the ACK_flag is active the status flag is updated every 35 milliseconds.

If the communication speed is known, choose the ***5.4 FLAG_HOLD_TIME*** large enough to give the host the possibility to detect the state of the flags.

To set-up a more secure system use the acknowledge method. A disadvantage is the increase in communication time.

5.4 FLAG_HOLD_TIME is located in the coms0300.dat file.
See also chapter 9.4 Appendix D: Coms0300.dat file

7.6 How data is written to the float field

Field 6 (addresses are default mapped to address 7500) is the read/write field for floats.
Current applications for writing to the UFP-V system are:

1. **API settings** for the parameters used in the UFP-Program for calculating Standard/Mass flow and totals. The addresses used are 7501…7514 for floats and 2068…2069, 2201.. 2214 for Booleans

2. **External flow meter settings** for the parameters used in the UFP-Program for proving an external flow meter such as a turbine meter.
   Connection is established through a pulse input and temperature and pressure at external conditions. The addresses used are 7521…7523 for floats and 2070, 2071, 2221… 2223 for Booleans

3. **System time deviation**
   The UFP-Program has a system time that can be altered by input of deviation [s] on current system time.
   In file COMS0300.dat section 5.6 this must be configured to enable the writing.
   For current system time see Integers 3033…3038
   The addresses used for writing are 7577 for floats and 2230 for Booleans.

4. **Densito meter calibration data**
   The UFP-Program can measure the density with a densito meter.
   There are 4 data sets, 2 for Solartron and 2 for Sarasota.
   See Floats 7531…7566 and Booleans 2231…2241 for writing the data.

5. **Override values on secondary inputs**
   In the UFP-Program it is possible to manually override the secondary input values when the specific parameter is used in the calculation and the Alarm output is enabled in the Initialisation file CLNT0300.dat
   See Floats 7578…7588 and Booleans 2072…2081 and 2243…2255.

6. **UFP Batch control (internal batch)**
   The UFP-Program is capable of batching. A serial printer connected to the UFP prints tickets.
   This batch control is done by a single float 7530 that handles specific float values as control commands.
   On success the float value returns 1 on not permitted returns 0.
   For status on batch control etc. see Integers 3020…3023 and Long 5008.
   Internal UFP-Program batch is done by batch1 values see Float 7077…7127.

7. **Secondary inputs through Modbus communication**
   Instead of using AD or frequency input it is possible to measure a secondary input through Modbus.
   Note that this must be configured in the CLNT0300.dat file section 9.
   The time out value on new input can be configured in file COMS0300.dat section 5.5.
   If the new value is not written before this timeout value elapses the specific input generates an alarm. After every new input value, the time out counter is reset.
   See Floats 7567…7576.

Applications 1…5 can only be accessed for writing when first a Boolean is set that enables writing for 30 seconds. This is described in the next paragraph 7.6.1

7.6.1 How to write in the float field to the specific application

Applications 1…5 can only be accessed for writing when first a Boolean is set that enables writing for 30 seconds.
How to handle:

- To enable writing to a float field as described in application 1...5, an enable Boolean referring to the application must be written to the xxxxx *enable writing data* Boolean.
  For example for application 1 this is Boolean 2201.
- After writing this Boolean there will be 30 seconds of time to write float data to the application field. The time remaining to write to the application field can be read from float xxxxx *Time to update a parameter*
  For example for application 1 this is Float 7501
- If data is changed this can be read in the Boolean field as mentioned per application. These Booleans must be reset by the host
  For example for application 1 this is Booleans 2202…2214
- There is also an overall data changed Boolean per specific application. This Boolean automatic resets after saving the data.
  For example for application 1 this is Boolean 2068.
- When data is changed it can be secured by saving it in the UFP-V system. This is done by writing an enable Boolean per application field.
  For example application 1 is Boolean 2069.

  This action will automatically reset (0) the Booleans:
  Xxxxx Data changed in float write field. For example application 1 is Boolean 2068.
  xxxxx Save changed data in float write field. For example application 1 is Boolean 2069
  xxxxx Enable writing data. For example application 1 is Boolean 2201

8 MODBUS MAPPING ASSIGNMENTS

The available data is grouped in 9 levels (groups):

1. Gross flow measurement
2. Standard flow measurement
3. Net flow measurement
4. Batching, includes normally the levels 1..3
5. Analysis, diagnostics, quality
6. Control data
7. Used settings (corrections on/of etc)
8. Master meter configuration (direct connection with duty meter)
9. Data measured but not directly used by Altosonic-V, but as an extra service.

8.1 Field 0 (Read only Boolean field)

This data is read only and can be accessed with Modbus function 1 and 2 in Modbus slave mode and with functions 5 and 15 in Modbus master mode.

Without further notice 0=non and 1=active

By default the start addresses are mapped to address **1000** (default value)

start address ModiconComp NotModiconComp	Type+Access	Description	Level	Level	Level	Remark
1	B+R	Basic flow measurement warning	1	5		
2	B+R	Basic flow measurement error	1	5		
3	B+R	System runtime warning	1	5		
4	B+R	System runtime error	1	5		
5	B+R	System set-up warning	1	5		
6	B+R	System set-up error	1	5		
7	B+R	Totaliser process: sum totalizer rollover occurred	1	5		
8	B+R	Totaliser process: totalizer reset occurred	1	5		
9	B+R	Flow direction	1			0=forward 1=reverse
10	B+R	Algo. Basic flow on output	1	7		
11	B+R	Reserved				
12	B+R	Algo. Reyn. Correction on output.	1	7		
13	B+R	Swirl correction on output	1	7		
14	B+R	Temperature correction on output	1	7		
15	B+R	Standard volume on output	2	7		
16	B+R	API group out of range	2	5		
17	B+R	Correction parameters hold. Due to flow deviation	1	5		
18	B+R	Check Modbus totalisers and batch 1+2 values on hold (see Bool2075)	4			
19	B+R	Alarm on reading: temperature process	2	5		
20	B+R	Alarm on reading: pressure process	1	2	5	
21	B+R	Alarm on reading: densitometer density	2	5		
22	B+R	Alarm on reading: temperature body	1	5		
23	B+R	Totaliser standard: sum totaliser rollover occurred	2	5		

24	B+R	Totaliser standard: totaliser reset occurred	2	5		
25	B+R	Totaliser process: forward totaliser rollover occurred	1	5		
26	B+R	Totaliser process: reverse totaliser rollover occurred	1	5		
27	B+R	Totaliser standard: forward totaliser rollover occurred	2	5		
28	B+R	Totaliser standard: reverse totaliser rollover occurred	2	5		
29	B+R	Totaliser mass: sum totalizer rollover occurred	2	5		
30	B+R	Totaliser mass: totalizer reset occurred	2	5		
31	B+R	Totaliser mass: forward totalizer rollover occurred	2	5		
32	B+R	Totaliser mass: reverse totalizer rollover occurred	2	5		
33	B+R	Over range data path 1	1	5		
34	B+R	Over range data path 2	1	5		
35	B+R	Over range data path 3	1	5		
36	B+R	Over range data path 4	1	5		
37	B+R	Over range data path 5	1	5		
38	B+R	Path failure path 1	1	5		
39	B+R	Path failure path 2	1	5		
40	B+R	Path failure path 3	1	5		
41	B+R	Path failure path 4	1	5		
42	B+R	Path failure path 5	1	5		
43	B+R	Deviation in sound velocity path 1	1	5		
44	B+R	Deviation in sound velocity path 2	1	5		
45	B+R	Deviation in sound velocity path 3	1	5		
46	B+R	Deviation in sound velocity path 4	1	5		
47	B+R	Deviation in sound velocity path 5	1	5		
48	B+R	Communication failure path 1	1	5		
49	B+R	Communication failure path 2	1	5		
50	B+R	Communication failure path 3	1	5		
51	B+R	Communication failure path 4	1	5		
52	B+R	Communication failure path 5	1	5		
53	B+R	Real profile sampling on hold. By channel fails or flow dev	1	5		
54	B+R	Alarm on reading: external Viscosity	1	5		Default:not used
55	B+R	Alarm on reading: temperature densitometer	2	5		
56	B+R	Alarm on reading: pressure densitometer	2	5		
57	B+R	Alarm on reading: temperature proving (external flowmeter)	8	5		
58	B+R	Alarm on reading: pressure proving (external flowmeter)	8	5		
59	B+R	Densitometer switch alarm	2	5		
60	B+R	Real profile out of range during correction of channel(s)	1	5		
61	B+R	Alarm on reading: standard density input	2	5		
62	B+R	Alarm on service value: temperature body	1	5		
63	B+R	Alarm on service value: temperature process	1	2	5	
64	B+R	Alarm on service value: temperature proving (ext flowm)	9	8	5	
65	B+R	Alarm on service value: temperature densitometer	9	5		
66	B+R	Alarm on service value: pressure process	9	5		
67	B+R	Alarm on service value: pressure proving (ext .flowm.)	9	8	5	
68	B+R	Alarm on service value: pressure densitometer	9	5		
69	B+R	Alarm on service value: densitometer density	9	5		
70	B+R	Alarm on service value: standard density	9	5		
71	B+R	Alarm on service value: viscosity external	9	5		
72	B+R	OVERRIDE enable possible for temperature body	1	7		
73	B+R	OVERRIDE enable possible for temperature process	2	7		
74	B+R	OVERRIDE enable possible for temperature proving (ext flowm)	8	7		
75	B+R	OVERRIDE enable possible for temperature densitometer	2	7		
76	B+R	OVERRIDE enable possible for pressure process	1	2	7	

77	B+R	OVERRIDE enable possible for pressure proving (ext flowm)	8	7		
78	B+R	OVERRIDE enable possible for pressure densitometer	2	7		
79	B+R	OVERRIDE enable possible for density densitometer	2	7		
80	B+R	OVERRIDE enable possible for density standard	2	7		
81	B+R	OVERRIDE enable possible for viscosity external	1	7		
82	B+R	OVERRIDE default (automatic) temperature body	1	5		if enabled in CLNT0300.dat
83	B+R	OVERRIDE default (automatic) temperature process	2	5		if enabled in CLNT0300.dat
84	B+R	OVERRIDE default (automatic) temperature proving (ext flowm)	8	5		if enabled in CLNT0300.dat
85	B+R	OVERRIDE default (automatic) temperature densitometer	2	5		if enabled in CLNT0300.dat
86	B+R	OVERRIDE default (automatic) pressure process	2	5		if enabled in CLNT0300.dat
87	B+R	OVERRIDE default (automatic) pressure proving (ext flowm)	8	5		if enabled in CLNT0300.dat
88	B+R	OVERRIDE default (automatic) pressure densitometer	2	5		if enabled in CLNT0300.dat
89	B+R	OVERRIDE default (automatic) density densitometer	2	5		if enabled in CLNT0300.dat
90	B+R	OVERRIDE default (automatic) density standard	2	5		if enabled in CLNT0300.dat
91	B+R	OVERRIDE default (automatic) viscosity external	1	5		if enabled in CLNT0300.dat
92	B+R	Batch valid. on last stopped batch (no mem after program stop)	4			0=not valid 1=valid
93	B+R	Alarm on Reynolds value: outside of the allowed range	1	5		
94	B+R	OVERRIDE enable possible for BS&W percentage	3	7		
95	B+R	OVERRIDE default (automatic) BS&W percentage	3	5		if enabled in CLNT0300.dat
96	B+R	Alarm on reading: BS&W percentage	3	5		
97	B+R	Alarm on service value: BS&W percentage	9	3		

8.2 Field 1 (Read/Write Boolean Field)

These data can be accessed with Modbus function 1, 2, 5 and 15.
Without further notice 0=non and 1=active

By default the start addresses are mapped to address **2000** (default value)

start address ModiconComp NotModiconComp	Type+Access	Description	Level	Level	Level	Remark
1	B+RW	Acknowledge_flags_field_00	6	5		
2	B+RW	Acknowledge_flags_field_01	6	5		
3	B+RW	Acknowledge_flags_field_02	6	5		
4	B+RW	Acknowledge_flags_field_03	6	5		
5	B+RW	Acknowledge_flags_field_04	6	5		
6	B+RW	Acknowledge_flags_field_05	6	5		
7	B+RW	Acknowledge_flags_field_06	6	5		
8	B+RW	Acknowledge_flags_field_07	6	5		
9	B+RW	Acknowledge_flags_field_08	6	5		
10	B+RW	Acknowledge_flags_field_09	6	5		
11	B+RW	Acknowledge_flags_field_00	6	5		
12	B+RW	Acknowledge_flags_field_11	6	5		
13	B+RW	Acknowledge_flags_field_12	6	5		
14	B+RW	Acknowledge_flags_field_13	6	5		
15	B+RW	Acknowledge_flags_field_14	6	5		
16	B+RW	Acknowledge_flags_field_15	6	5		
17	B+RW	Acknowledge_flags_field_16	6	5		
18	B+RW	Acknowledge_flags_field_17	6	5		

19	B+RW	Acknowledge_flags_field_18	6	5		
20	B+RW	Acknowledge_flags_field_19	6	5		
21	B+RW	Acknowledge_flags_field_20	6	5		
22	B+RW	Acknowledge_flags_field_21	6	5		
23	B+RW	Acknowledge_flags_field_22	6	5		
24	B+RW	Acknowledge_flags_field_23	6	5		
25	B+RW	Acknowledge_flags_field_24	6	5		
26	B+RW	Acknowledge_flags_field_25	6	5		
27	B+RW	Acknowledge_flags_field_26	6	5		
28	B+RW	Acknowledge_flags_field_27	6	5		
29	B+RW	Acknowledge_flags_field_28	6	5		
30	B+RW	Acknowledge_flags_field_29	6	5		
31	B+RW	Acknowledge_flags_field_30	6	5		
32	B+RW	Acknowledge_flags_field_31	6	5		
33	B+RW	Acknowledge_flags_field_32	6	5		
34	B+RW	Acknowledge_flags_field_33	6	5		
35	B+RW	Acknowledge_flags_field_34	6	5		
36	B+RW	Acknowledge_flags_field_35	6	5		
37	B+RW	Acknowledge_flags_field_36	6	5		
38	B+RW	Acknowledge_flags_field_37	6	5		
39	B+RW	Acknowledge_flags_field_38	6	5		
40	B+RW	Acknowledge_flags_field_39	6	5		
41	B+RW	Acknowledge_flags_field_40	6	5		
42	B+RW	Acknowledge_flags_field_41	6	5		
43	B+RW	Acknowledge_flags_field_42	6	5		
44	B+RW	Acknowledge_flags_field_43	6	5		
45	B+RW	Acknowledge_flags_field_44	6	5		
46	B+RW	Acknowledge_flags_field_45	6	5		
47	B+RW	Acknowledge_flags_field_46	6	5		
48	B+RW	Acknowledge_flags_field_47	6	5		
49	B+RW	Acknowledge_flags_field_48	6	5		
50	B+RW	Acknowledge_flags_field_49	6	5		
51	B+RW	Acknowledge_flags_field_50	6	5		
52	B+RW	Acknowledge_flags_field_51	6	5		
53	B+RW	Acknowledge_flags_field_52	6	5		
54	B+RW	Acknowledge_flags_field_53	6	5		
55	B+RW	Acknowledge_flags_field_54	6	5		
56	B+RW	Acknowledge_flags_field_55	6	5		
57	B+RW	Acknowledge_flags_field_56	6	5		
58	B+RW	Acknowledge_flags_field_57	6	5		
59	B+RW	Acknowledge_flags_field_58	6	5		
60	B+RW	Acknowledge_flags_field_59	6	5		
61	B+RW	Acknowledge_flags_field_60	6	5		
62	B+RW	Acknowledge_flags_field_61	6	5		
63	B+RW	Acknowledge_flags_field_62	6	5		
64	B+RW	Acknowledge_flags_field_63	6	5		
65	B+RW	General_acknowledge_flags_field_0	6	5		
66	B+RW	Reset all errors	1	6		
67	B+RW	Reset all totalizers and all errors	1	6		automatic reset
68	B+RW	API: data changed in float write field (API 202..218)	2	6		automatic reset
69	B+RW	API: save changed data in float write field (API 202..218)	2	6		automatic reset
70	B+RW	EXT: data changed in float write field (EXT 222..225)	8	6		automatic reset

71	B+RW	EXT: save changed data in float write field (EXT 222..225)	8	6		automatic reset
72	B+RW	EXT: restart proving of external flowmeter	8	6		automatic reset
73	B+RW	Batch 1 reset averages For Continuous Pipe Line Measurement by host , not for the UFP internal CPL batch mode	4			automatic reset
74	B+RW	Batch 2 reset averages For Continuous Pipe Line Measurement by host , not for the UFP internal CPL batch mode	4	6		automatic reset
75	B+RW	Modbus output for all totalisers and batch 1+2 values on hold for 30 sec. (Internally all totalisers continue)	4	6		automatic reset
76	B+RW	During batch. Guard Digital contact, CLNT0300.DAT item 20.04 and 20.05,see also Operating manual 10.4.3	4	6		automatic reset
77..200		Reserved				
201	B+RW	API enable writing data	2	6		reset after 30 sec
202	B+RW	API change in: correction type	2	6		manual reset
203	B+RW	API change in: density standard type	2	6		manual reset
204	B+RW	API change in: fluid type	2	6		manual reset
205	B+RW	API change in: stand. density crude (fluid type 0)	2	6		manual reset
206	B+RW	API change in: stand. density gasoline (fluid type 1)	2	6		manual reset
207	B+RW	API change in: stand. density trans.area (fluid type 2)	2	6		manual reset
208	B+RW	API change in: stand. density jet group (fluid type 3)	2	6		manual reset
209	B+RW	API change in: stand. density fuel oil (fluid type 4)	2	6		manual reset
210	B+RW	API change in: stand. density free fill (fluid type 5)	2	6		manual reset
211	B+RW	API change in: free Fill K0	2	6		manual reset
212	B+RW	API change in: free Fill K1	2	6		manual reset
213	B+RW	API change in: free Fill K2	2	6		manual reset
214	B+RW	API change in: temperature standard	2	6		manual reset
215	B+RW	Change in: correction standard	2	6		manual reset
216	B+RW	Change in: ASTM-IP stand. density	2	6		manual reset
217	B+RW	Change in: LPG stand. density	2	6		manual reset
218	B+RW	Change in: LPG equilibrium pressure	2	6		manual reset
219..220		Reserved				
221	B+RW	EXT enable writing data	8	6		automatic reset
222	B+RW	EXT change in: K-factor external flowmeter	8	6		manual reset
223	B+RW	EXT change in: parameters changeable under flowing conditions or under low flow cuttoff	8	6		manual reset
224	B+RW	Change in: MeterFactor (Fwd)	1	6		if enabled in set-up
225	B+RW	Change in: MeterFactor (Rev)	1	6		if enabled in set-up
226..229		Reserved				
230	B+RW	SYSTEM TIME deviation enable writing (see float 7577)	4	6		if enabled in set-up
231	B+RW	SOLARTRON1 enable writing data	2	6		automatic reset
232	B+RW	SOLARTRON1 change in: calibration data	2	6		automatic reset
233	B+RW	SOLARTRON1 save and enable written data	2	6		automatic reset
234	B+RW	SOLARTRON2 enable writing data	2	6		automatic reset
235	B+RW	SOLARTRON2 change in: calibration data	2	6		automatic reset
236	B+RW	SOLARTRON2 save and enable written data	2	6		automatic reset
237	B+RW	SARASOTA1 enable writing data	2	6		automatic reset
238	B+RW	SARASOTA1 change in: calibration data	2	6		automatic reset
239	B+RW	SARASOTA1 save and enable written data	2	6		automatic reset
240	B+RW	SARASOTA2 enable writing data	2	6		automatic reset
241	B+RW	SARASOTA2 change in: calibration data	2	6		automatic reset
242	B+RW	SARASOTA2 save and enable written data	2	6		automatic reset
243	B+RW	OVERRIDE: enable writing data	1	2	6	automatic reset 30s
244	B+RW	OVERRIDE: change in: OVERRIDE data	1	2	6	automatic reset

245	B+RW	OVERRIDE: save and enable written data	1	2	6	
246	B+RW	OVERRIDE: enable to set value temperature body	1	6		if enable to override
247	B+RW	OVERRIDE: enable to set value temperature process	2	6		if enable to override
248	B+RW	OVERRIDE: enable to set value temperature proving	8	6		if enable to override
249	B+RW	OVERRIDE: enable to set value temperature densitometer	2	6		if enable to override
250	B+RW	OVERRIDE: enable to set value pressure process	1	2	6	if enable to override
251	B+RW	OVERRIDE: enable to set value pressure proving	8	6		if enable to override
252	B+RW	OVERRIDE: enable to set value pressure densitometer to OVERRIDE	2	6		if enable to override
253	B+RW	OVERRIDE: enable to set value density densitometer to OVERRIDE	2	6		if enable to override
254	B+RW	OVERRIDE: enable to set value density standard to OVERRIDE	2	6		if enable to override
255	B+RW	OVERRIDE: enable to set value viscosity to OVERRIDE	2	6		if enable to override
256	B+RW	V.O.S. failure alarm (0=OFF.1=ON. if enabled)	1	6		if enabled in setup
257	B+RW	V.O.S. failure alarm enable (0=NO.1=YES. if enabled)	1	6		if enabled in setup
258	B+RW	BS&W status indication for F7591; 0=ERROR. 1=OK	3	6		if enabled in setup
259	B+RW	OVERRIDE enable to set value BS&W percentage to OVERRIDE	3	6		if enabled in setup

Reset totalisers will automatically reset the rollover bits of all totalisers, alarms and process time.

8.3 Field 2 (Read only Integer Field)

This data is read only and can be accessed with Modbus function 3 and 4 in Modbus slave mode and with functions 6 and 16 in Modbus master mode.

By default the start addresses are mapped to address **3000** (default value)

start address ModiconComp NotModiconComp	Type+Access	Description	Level	Level	Level	Remark
1	I16+R	Flow process	1			scaled –32768…32767 ó -125%… +125%
2	I16+R	Sound velocity average	1			scaled –32768…32767 ó -3276.8…3276.7 m/s
3	I16+R	Temperature process	2			scaled –32768…32767 ó -327.68…327.67 ℃
4	I16+R	Pressure process	1	2		scaled –32768…32767 ó -327.68…327.67 Bar
5	I16+R	Density process	2			scaled 0...32767 ó 0…1683.35 kg/m3
6	I16+R	Temperature body	1			scaled –32768…32767 ó -327.68...327.67 ℃
7	I16+R	Flow standard	2			scaled –32768…32767 ó -125% …+125%
8	I16+R	Flow mass	2			scaled –32768…32767 ó -125% …+125%
9	I16+R	Flow of channel 1	5	1		scaled –32768…32767 ó -125% …+125%
10	I16+R	Flow of channel 2	5	1		scaled –32768…32767 ó -125% …+125%
11	I16+R	Flow of channel 3	5	1		scaled –32768…32767 ó -125% …+125%
12	I16+R	Flow of channel 4	5	1		scaled –32768…32767 ó -125% …+125%
13	I16+R	Flow of channel 5	5	1		scaled –32768…32767 ó -125% …+125%
14	I16+R	Sound velocity of channel 1	5	1		scaled 0…32767 ó 0…3276.7 m/s
15	I16+R	Sound velocity of channel 2	5	1		scaled 0…32767 ó 0…3276.7 m/s
16	I16+R	Sound velocity of channel 3	5	1		scaled 0…32767 ó 0…3276.7 m/s
17	I16+R	Sound velocity of channel 4	5	1		scaled 0…32767 ó 0…3276.7 m/s
18	I16+R	Sound velocity of channel 5	5	1		scaled 0…32767 ó 0…3276.7 m/s
19	I16+R	Density meter choice	2			0=AD /Modbus input 1=Solartron1 2=Solartron2 3=Sarasota 1 4=Sarasota2 5=Freq-span
20	I16+R	UFP batch1 ticket number	4			0…32767
21	I16+R	UFP batch1 status	4			0=non 1=setup 2=running 3=end-batch 5=end-printing 6=end-printfail 7=confirm 10=reset
22	I16+R	UFP batch1 printer status	4			0=Ready to print1=Fail in printing 2=Busy (During print task) 2=Check for printer connection (when no print task) 3=No printer connection
23	I16+R	UFP batch1 print task	4			0 =No print task 1…2 =Attempt to print first character of header 3 =Time out value countdown for actual printing 4…98 =Printing headers
24	I16+R	Reserved				
25	I16+R	System set-up warning/error number	5	1		[ ]
26	I16+R	System runtime warning/error number	5	1		[ ]

27	I16+R	System messages 01..16	5	1		[ ]
28	I16+R	System messages 17..32	5	1		[ ]
29	I16+R	System messages 33..48	5	1		[ ]
30	I16+R	System messages 49..64	5	1		[ ]
31	I16+R	Number of current warnings	1	2	3	[ ] Applicable to all levels
32	I16+R	Number of current alarms	1	2	3	[ ] Applicable to all levels
33	I16+R	SYSTEM TIME: seconds	2			0…59
34	I16+R	SYSTEM TIME: minutes	2			0…59
35	I16+R	SYSTEM TIME: hours	2			0…23
36	I16+R	SYSTEM TIME: day	2			1…31
37	I16+R	SYSTEM TIME: month	2			1…12
38	I16+R	SYSTEM TIME: year	2			2001…
39	I16+R	MP103 FreqOutp. Flow_direction	7			0=fwd, 1=fwd&rev
40	I16+R	MP103 FreqOutp. Frequency_mode	7			see clnt0300.dat file
41	I16+R	Number of values in use (FIFO) for Gross Flow Average	5			[ ]
42	I16+R	Last Batch Result Status Bits (7 LSB)	4			[ ]
43	I16+R	Batch start: Resetable Totaliser Fract. (sum)	4	1		0.xxxx m3
44	I16+R	Batch start: Resetable Totaliser Fract. (fwd)	4	1		0.xxxx m3
45	I16+R	Batch start: Resetable Totaliser Fract. (rev)	4	1		0.xxxx m3
46	I16+R	Batch start: Resetable Standard Totaliser Fract. (sum)	4	2		0.xxxx m3
47	I16+R	Batch start: Resetable Standard Totaliser Fract. (fwd)	4	2		0.xxxx m3
48	I16+R	Batch start: Resetable Standard Totaliser Fract. (rev)	4	2		0.xxxx m3
49	I16+R	Batch start: Resetable Mass Totaliser Fract. (sum)	4	2		0.xxxx ton
50	I16+R	Batch start: Resetable Mass Totaliser Fract. (fwd)	4	2		0.xxxx ton
51	I16+R	Batch start: Resetable Mass Totaliser Fract. (rev)	4	2		0.xxxx ton
52	I16+R	Batch start: Resetable Ext. Standard Totaliser Fract. (sum)	4	8		0.xxxx m3
53	I16+R	Batch start: Resetable Ext. Standard Totaliser Fract. (fwd)	4	8		0.xxxx m3
54	I16+R	Batch start: Resetable Ext. Standard Totaliser Fract. (rev)	4	8		0.xxxx m3
55	I16+R	Batch start: NonResetable Totaliser Fract. (sum)	4	1		0.xxxx m3
56	I16+R	Batch start: NonResetable Totaliser Fract. (fwd)	4	1		0.xxxx m3
57	I16+R	Batch start: NonResetable Totaliser Fract. (rev)	4	1		0.xxxx m3
58	I16+R	Batch start: NonResetable Standard Totaliser Fract. (sum)	4	2		0.xxxx m3
59	I16+R	Batch start: NonResetable Standard Totaliser Fract. (fwd)	4	2		0.xxxx m3
60	I16+R	Batch start: NonResetable Standard Totaliser Fract. (rev)	4	2		0.xxxx m3
61	I16+R	Batch start: NonResetable Mass Totaliser Fract. (sum)	4	2		0.xxxx ton
62	I16+R	Batch start: NonResetable Mass Totaliser Fract. (fwd)	4	2		0.xxxx ton
63	I16+R	Batch start: NonResetable Mass Totaliser Fract. (rev)	4	2		0.xxxx ton
64	I16+R	Batch stop: Resetable Totaliser Fract. (sum)	4	1		0.xxxx m3
65	I16+R	Batch stop: Resetable Totaliser Fract. (fwd)	4	1		0.xxxx m3
66	I16+R	Batch stop: Resetable Totaliser Fract. (rev)	4	1		0.xxxx m3
67	I16+R	Batch stop: Resetable Standard Totaliser Fract. (sum)	4	2		0.xxxx m3
68	I16+R	Batch stop: Resetable Standard Totaliser Fract. (fwd)	4	2		0.xxxx m3
69	I16+R	Batch stop: Resetable Standard Totaliser Fract. (rev)	4	2		0.xxxx m3
70	I16+R	Batch stop: Resetable Mass Totaliser Fract. (sum)	4	2		0.xxxx ton
71	I16+R	Batch stop: Resetable Mass Totaliser Fract. (fwd)	4	2		0.xxxx ton
72	I16+R	Batch stop: Resetable Mass Totaliser Fract. (rev)	4	2		0.xxxx ton
73	I16+R	Batch stop: Resetable Ext. Standard Totaliser Fract. (sum)	4	8		0.xxxx m3
74	I16+R	Batch stop: Resetable Ext. Standard Totaliser Fract. (fwd)	4	8		0.xxxx m3
75	I16+R	Batch stop: Resetable Ext. Standard Totaliser Fract. (rev)	4	8		0.xxxx m3
76	I16+R	Batch stop: NonResetable Totaliser Fract. (sum)	4	1		0.xxxx m3
77	I16+R	Batch stop: NonResetable Totaliser Fract. (fwd)	4	1		0.xxxx m3
78	I16+R	Batch stop: NonResetable Totaliser Fract. (rev)	4	1		0.xxxx m3

79	I16+R	Batch stop: NonResetable Standard Totaliser Fract. (sum)	4	2		0.xxxx m3
80	I16+R	Batch stop: NonResetable Standard Totaliser Fract. (fwd)	4	2		0.xxxx m3
81	I16+R	Batch stop: NonResetable Standard Totaliser Fract. (rev)	4	2		0.xxxx m3
82	I16+R	Batch stop: NonResetable Mass Totaliser Fract. (sum)	4	2		0.xxxx ton
83	I16+R	Batch stop: NonResetable Mass Totaliser Fract. (fwd)	4	2		0.xxxx ton
84	I16+R	Batch stop: NonResetable Mass Totaliser Fract. (rev)	4	2		0.xxxx ton
85	I16+R	Batch start: Year	4			[ ]
86	I16+R	Batch start: Month	4			[ ]
87	I16+R	Batch start: Day	4			[ ]
88	I16+R	Batch start: Hour	4			[ ]
89	I16+R	Batch start: Minute	4			[ ]
90	I16+R	Batch start: Second	4			[ ]
91	I16+R	Batch stop: Year	4			[ ]
92	I16+R	Batch stop: Month	4			[ ]
93	I16+R	Batch stop: Day	4			[ ]
94	I16+R	Batch stop: Hour	4			[ ]
95	I16+R	Batch stop: Minute	4			[ ]
96	I16+R	Batch stop: Second	4			[ ]

8.4 Field 3 (Read only Long Integer Field)

This data is read only and can be accessed with Modbus function 3 and 4 in Modbus slave mode and with functions 6 and 16 in Modbus master mode.

By default the start addresses are mapped to address **5000** (default value)

start address NotModiconComp	start address ModiconComp	Type+Access	Description	Level	Level	Level	Remark
1	1	I32+R	Resetable totaliser process sum	1			liter
2	3	I32+R	Flow process	1			scaled -32768 ... +32767 ó -125% …+125%
3	5	I32+R	Sound velocity average	5			scaled 0…32767 ó 0…3276.7 m/s
4	7	I32+R	resetable totaliser standard sum	2			liter
5	9	I32+R	Flow standard	2			scaled -32768 … +32767 ó -125%… +125%
6	11	I32+R	Resetable totalizer mass sum	2			kg
7	13	I32+R	Flow: mass	2			scaled -32768 … +32767 ó -125%… +125%
8	15	I32+R	UFP batch1 ticket count	4			0….2147483647
9	17	I32+R	Resetable totaliser: process forward	1			liter
10	19	I32+R	Resetable totaliser: process reverse	1			liter
11	21	I32+R	Resetable totaliser: standard forward	2			liter
12	23	I32+R	Resetable totaliser: standard reverse	2			liter
13	25	I32+R	Resetable totaliser: mass forward	2			kg
14	27	I32+R	Resetable totaliser: mass reverse	2			kg
15	29	I32+R	UFP serial number	1			[ ]
16	31	I32+R	Software version	1			[ ]
17	33	I32+R	System set-up warning/error number	1			[ ]
18	35	I32+R	System runtime warning/error number	1			[ ]
19	37	I32+R	System messages 01...32	1			[ ]
20	39	I32+R	System messages 33...64	1			[ ]
21	41	I32+R	Resetable totaliser: external flowmeter actual total	8			liter
22	43	I32+R	Resetable totaliser: external flowmeter standard total	8			liter
23	45	I32+R	Resetable totaliser: external flowmeter mass total	8			kg
24	47	I32+R	Process time (resets on totaliser reset)	5			s, used as watch dog for host
25	49	I32+R	Non resetable totaliser: process sum	1			0.1m3
26	51	I32+R	Non resetable totaliser: process forward	1			0.1m3
27	53	I32+R	Non resetable totaliser: process reverse	1			0.1m3
28	55	I32+R	Non resetable totaliser: standard sum	2			0.1m3
29	57	I32+R	Non resetable totaliser: standard forward	2			0.1m3
30	59	I32+R	Non resetable totaliser: standard reverse	2			0.1m3
31	61	I32+R	Non resetable totaliser: mass sum	2			0.1 ton
32	63	I32+R	Non resetable totaliser: mass forward	2			0.1 ton
33	65	I32+R	Non resetable totaliser: mass reverse	2			0.1 ton
34	67	I32+R	Resetable totaliser: process sum (nett.oil)	3			liter
35	69	I32+R	Resetable totaliser: process forward (nett.oil)	3			liter
36	71	I32+R	Resetable totaliser: process reverse (nett.oil)	3			liter
37	73	I32+R	Resetable totaliser: standard sum (nett.oil)	3			liter
38	75	I32+R	Resetable totaliser: standard forward (nett.oil)	3			liter
39	77	I32+R	Resetable totaliser: standard reverse (nett.oil)	3			liter
40	79	I32+R	Resetable totaliser: mass sum (nett.oil)	3			kg

41	81	I32+R	Resetable totaliser: mass forward (nett.oil)	3			kg
42	83	I32+R	Resetable totaliser: mass reverse (nett.oil)	3			kg
43	85	I32+R	Non resetable totaliser: process sum (nett.oil)	3			liter
44	87	I32+R	Non resetable totaliser: process forward (nett.oil)	3			liter
45	89	I32+R	Non resetable totaliser: process reverse (nett.oil)	3			liter
46	91	I32+R	Non resetable totaliser: standard sum (nett.oil)	3			liter
47	93	I32+R	Non resetable totaliser: standard forward (nett.oil)	3			liter
48	95	I32+R	Non resetable totaliser: standard reverse (nett.oil)	3			liter
49	97	I32+R	Non resetable totaliser: mass sum (nett.oil)	3			kg
50	99	I32+R	Non resetable totaliser: mass forward (nett.oil)	3			kg
51	101	I32+R	Non resetable totaliser: mass reverse (nett.oil)	3			kg
52	103	I32+R	Batch start: Resetable Totaliser (sum)	4	1		m3, fraction see Int16 reg
53	105	I32+R	Batch start: Resetable Totaliser (forward)	4	1		m3, fraction see Int16 reg
54	107	I32+R	Batch start: Resetable Totaliser (reverse)	4	1		m3, fraction see Int16 reg
55	109	I32+R	Batch start: Resetable Standard Totaliser (sum)	4	2		m3, fraction see Int16 reg
56	111	I32+R	Batch start: Resetable Standard Totaliser (forward)	4	2		m3, fraction see Int16 reg
57	113	I32+R	Batch start: Resetable Standard Totaliser (reverse)	4	2		m3, fraction see Int16 reg
58	115	I32+R	Batch start: Resetable Mass Totaliser (sum)	4	2		ton, fraction see Int16 reg
59	117	I32+R	Batch start: Resetable Mass Totaliser (forward)	4	2		ton, fraction see Int16 reg
60	119	I32+R	Batch start: Resetable Mass Totaliser (reverse)	4	2		ton, fraction see Int16 reg
61	121	I32+R	Batch start: Extern. Resetable Standard Totaliser (sum)	4	8		m3, fraction see Int16 reg
62	123	I32+R	Batch start: Extern. Resetable Standard Totaliser (forward)	4	8		m3, fraction see Int16 reg
63	125	I32+R	Batch start: Extern. Resetable Standard Totaliser (reverse)	4	8		m3, fraction see Int16 reg
64	127	I32+R	Batch start: NonResetable Totaliser (sum)	4	1		m3, fraction see Int16 reg
65	129	I32+R	Batch start: NonResetable Totaliser (forward)	4	1		m3, fraction see Int16 reg
66	131	I32+R	Batch start: NonResetable Totaliser (reverse)	4	1		m3, fraction see Int16 reg
67	133	I32+R	Batch start: NonResetable Standard Totaliser (sum)	4	2		m3, fraction see Int16 reg
68	135	I32+R	Batch start: NonResetable Standard Totaliser (forward)	4	2		m3, fraction see Int16 reg
69	137	I32+R	Batch start: NonResetable Standard Totaliser (reverse)	4	2		m3, fraction see Int16 reg
70	139	I32+R	Batch start: NonResetable Mass Totaliser (sum)	4	2		ton, fraction see Int16 reg
71	141	I32+R	Batch start: NonResetable Mass Totaliser (forward)	4	2		ton, fraction see Int16 reg
72	143	I32+R	Batch start: NonResetable Mass Totaliser (reverse)	4	2		ton, fraction see Int16 reg
73	145	I32+R	Batch stop: Resetable Totaliser (sum)	4	1		m3, fraction see Int16 reg
74	147	I32+R	Batch stop: Resetable Totaliser (forward)	4	1		m3, fraction see Int16 reg
75	149	I32+R	Batch stop: Resetable Totaliser (reverse)	4	1		m3, fraction see Int16 reg
76	151	I32+R	Batch stop: Resetable Standard Totaliser (sum)	4	2		m3, fraction see Int16 reg
77	153	I32+R	Batch stop: Resetable Standard Totaliser (forward)	4	2		m3, fraction see Int16 reg
78	155	I32+R	Batch stop: Resetable Standard Totaliser (reverse)	4	2		m3, fraction see Int16 reg
79	157	I32+R	Batch stop: Resetable Mass Totaliser (sum)	4	2		ton, fraction see Int16 reg
80	159	I32+R	Batch stop: Resetable Mass Totaliser (forward)	4	2		ton, fraction see Int16 reg
81	161	I32+R	Batch stop: Resetable Mass Totaliser (reverse)	4	2		ton, fraction see Int16 reg
82	163	I32+R	Batch stop: Extern. Resetable Standard Totaliser (sum)	4	8		m3, fraction see Int16 reg
83	165	I32+R	Batch stop: Extern. Resetable Standard Totaliser (forward)	4	8		m3, fraction see Int16 reg
84	167	I32+R	Batch stop: Extern. Resetable Standard Totaliser (reverse)	4	8		m3, fraction see Int16 reg
85	169	I32+R	Batch stop: NonResetable Totaliser (sum)	4	1		m3, fraction see Int16 reg
86	171	I32+R	Batch stop: NonResetable Totaliser (forward)	4	1		m3, fraction see Int16 reg
87	173	I32+R	Batch stop: NonResetable Totaliser (reverse)	4	1		m3, fraction see Int16 reg
88	175	I32+R	Batch stop: NonResetable Standard Totaliser (sum)	4	2		m3, fraction see Int16 reg
89	177	I32+R	Batch stop: NonResetable Standard Totaliser (forward)	4	2		m3, fraction see Int16 reg
90	179	I32+R	Batch stop: NonResetable Standard Totaliser (reverse)	4	2		m3, fraction see Int16 reg
91	181	I32+R	Batch stop: NonResetable Mass Totaliser (sum)	4	2		ton, fraction see Int16 reg
92	183	I32+R	Batch stop: NonResetable Mass Totaliser (forward)	4	2		ton, fraction see Int16 reg
93	185	I32+R	Batch stop: NonResetable Mass Totaliser (reverse)	4	2		ton, fraction see Int16 reg

94	187	I32+R	CRC for UFS files	1			[ ]
95	189	I32+R	CRC for UFP files	1			[ ]
96	191	I32+R	CRC for DAT files	1			[ ]
97	193	I32+R	CRC for (last) Ticket	1			[ ]
98	195	I32+R	CRC for Executable (program)	1			[ ]
99	197	I32+R	Serial number xxxxxxyyyy, project number x (6 or 7 digits)	1			[ ]
100	199	I32+R	Serial number xxxxxxyyyy, part number y (4 digits always)	1			[ ]

8.5 Field 4 (Read only Float Field)

This data is read only and can be accessed with Modbus function 3 and 4 in Modbus slave mode and with functions 6 and 16 in Modbus master mode.

By default the start addresses are mapped to address **7000** (default value)

start address NotModiconComp	start address ModiconComp	Type+Access	Description	Level	Level	Level	Remark
1	1	F32+R	Flow process	1			m^3/hr
2	3	F32+R	Sound velocity average	1			m/s
3	5	F32+R	Temperature process	2			℃
4	7	F32+R	Pressure process	1	2		bar
5	9	F32+R	Density process	1			kg/m^3
6	11	F32+R	Temperature body	1			℃
7	13	F32+R	Flow standard	2			m^3/hr
8	15	F32+R	Flow mass	2			ton/hr
9	17	F32+R	raw UFCdata Flow channel 1	5	1		-1250…1250
10	19	F32+R	raw UFCdata Flow channel 2	5	1		-1250…1250
11	21	F32+R	raw UFCdata Flow channel 3	5	1		-1250…1250
12	23	F32+R	raw UFCdata Flow channel 4	5	1		-1250…1250
13	25	F32+R	raw UFCdata Flow channel 5	5	1		-1250…1250
14	27	F32+R	Sound velocity of path 1	5	1		m/s
15	29	F32+R	Sound velocity of path 2	5	1		m/s
16	31	F32+R	Sound velocity of path 3	5	1		m/s
17	33	F32+R	Sound velocity of path 4	5	1		m/s
18	35	F32+R	Sound velocity of path 5	5	1		m/s
19	37	F32+R	Remaining hold time on correction. Due to flow deviation	5	1		m/s
20	39	F32+R	Reynolds number	5	1		[ ]
21	41	F32+R	Swirl % profile diagnostics	5	1		%
22	43	F32+R	Viscosity internal	5	1		cSt or 10^{-6} m^2/s
23	45	F32+R	A	5	1		[ ]
24	47	F32+R	B	5	1		[ ]
25	49	F32+R	A_offset	5	1		[ ]
26	51	F32+R	B_offset	5	1		[ ]
27	53	F32+R	Kr	5	1		[ ]
28	55	F32+R	Ks	5	1		[ ]
29	57	F32+R	Skewness % profile diagnostics	5	1		%
30	59	F32+R	Kbp Pressure Body expansion correction factor	1			[ ]
31	61	F32+R	Kb Thermal Body expansion correction factor	1			[ ]
32	63	F32+R	Density standard	2			kg/m^3
33	65	F32+R	Krohne use only				

34	67	F32+R	Krohne use only				
35	69	F32+R	Krohne use only				
36	71	F32+R	Krohne use only				
37	73	F32+R	Krohne use only				
38	75	F32+R	Remaining hold time on real-profile sampling. By flow deviation	5	1		s
39	77	F32+R	Average by stdev: raw UFCdata Flow channel 1	5	1		0 to 1000
40	79	F32+R	Average by stdev: raw UFCdata Flow channel 2	5	1		0 to 1000
41	81	F32+R	Average by stdev: raw UFCdata Flow channel 3	5	1		0 to 1000
42	83	F32+R	Average by stdev: raw UFCdata Flow channel 4	5	1		0 to 1000
43	85	F32+R	Average by stdev: raw UFCdata Flow channel 5	5	1		0 to 1000
44	87	F32+R	Viscosity external (default not used)	1			cSt or 10-6 m2/s
45	89	F32+R	Temperature densitometer	2			°C
46	91	F32+R	Pressure densitometer	2			bar
47	93	F32+R	Temperature proving (external flowmeter)	8			°C
48	95	F32+R	Pressure proving (external flowmeter)	8			bar
49	97	F32+R	stdev: raw UFCdata Flow channel 1	5	1		%'
50	99	F32+R	stdev: raw UFCdata Flow channel 2	5	1		%'
51	101	F32+R	stdev: raw UFCdata Flow channel 3	5	1		%'
52	103	F32+R	stdev: raw UFCdata Flow channel 4	5	1		%'
53	105	F32+R	stdev: raw UFCdata Flow channel 5	5	1		%'
54	107	F32+R	Standard deviation of flow	5	1		%'
55	109	F32+R	Max deviation on tau2::tau2/10 for correction path 1	5	1		%'
56	111	F32+R	Max deviation on tau2::tau2/10 for correction path 2	5	1		%'
57	113	F32+R	Max deviation on tau2::tau2/10 for correction path 3	5	1		%'
58	115	F32+R	Max deviation on tau2::tau2/10 for correction path 4	5	1		%'
59	117	F32+R	Max deviation on tau2::tau2/10 for correction path 5	5	1		%'
60	119	F32+R	Max deviation on tau2::tau2/10 for correction flow	5	1		%'
61	121	F32+R	Max deviation on treal::treal/10 for profile measure path 1	5	1		%'
62	123	F32+R	Max deviation on treal::treal/10 for profile measure path 2	5	1		%'
63	125	F32+R	Max deviation on treal::treal/10 for profile measure path 3	5	1		%'
64	127	F32+R	Max deviation on treal::treal/10 for profile measure path 4	5	1		%'
65	129	F32+R	Max deviation on treal::treal/10 for profile measure path 5	5	1		%'
66	131	F32+R	Max deviation on treal::treal/10 for profile measure	5	1		%'
67	133	F32+R	Density densitometer	2			kg/m3
68	135	F32+R	Maximum flow rate	7			m3/h
69	137	F32+R	Ctl (15°C to process)	2			[ ]
70	139	F32+R	Cpl (0 bar to process)	2			[ ]
71	141	F32+R	Ctl (15°C to standard)	2			[ ]
72	143	F32+R	Cpl (0 bar to standard. always 1)	2			[ ]
73	145	F32+R	Ctl (15°C to densitometer)	2			[ ]
74	147	F32+R	Cpl (0 bar to densitometer)	2			[ ]
75	149	F32+R	Ctl (15°C to proving external flowmeter)	2			[ ]
76	151	F32+R	Cpl (0 bar to proving external flowmeter)	2			[ ]
77	153	F32+R	Batch 1 average temperature body	4	1		°C
78	155	F32+R	Batch 1 average temperature process	4	2		°C
79	157	F32+R	Batch 1 average temperature proving (external flowmeter)	4	8		°C
80	159	F32+R	Batch 1 average temperature densitometer	4	2		°C
81	161	F32+R	Batch 1 average pressure process	4	1	2	bar
82	163	F32+R	Batch 1 average pressure proving (external flowmeter)	4	8		bar
83	165	F32+R	Batch 1 average pressure densitimeter	4	2		bar
84	167	F32+R	Batch 1 average density densitometer	4	2		kg/m3
85	169	F32+R	Batch 1 average density standard	4	2		kg/m3
86	171	F32+R	Batch 1 avarage BS&W in percent	4	3		%

87	173	F32+R	Batch 1 average Ctl (15°C to process)	4	2		[ ]
88	175	F32+R	Batch 1 average Cpl (0 bar to process)	4	2		[ ]
89	177	F32+R	Batch 1 average Ctl (15°C to standard)	4	2		[ ]
90	179	F32+R	Batch 1 average Cpl (0 bar to standard. always 1)	4	2		[ ]
91	181	F32+R	Batch 1 average Ctl (15°C to densitometer)	4	2		[ ]
92	183	F32+R	Batch 1 average Cpl (0 bar to densitometer)	4	2		[ ]
93	185	F32+R	Batch 1 average Ctl (15°C to proving external flowmeter)	4	8	2	[ ]
94	187	F32+R	Batch 1 average Cpl (0 bar to proving external flowmeter)	4	8	2	[ ]
95	189	F32+R	Batch 1 average temperature standard	4	2		°C
96	191	F32+R	Batch 1 average density process	4	2		kg/m3
97	193	F32+R	Batch 1 average flow proces	4	1		m3/h
98	195	F32+R	Batch 1 average density proving external flowmeter	4	8		kg/m3
99	197	F32+R	Batch 1 average flow proving external flowmeter	4	8		m3/h
100	199	F32+R	Batch 1 average Installed Kfactor proving (external flowmeter)	4	8		puls/liter
101	201	F32+R	Batch 1 found new Kfactor proving (external flowmeter)	4	8		puls/liter
102	203	F32+R	Batch 1 difference installed vs new found Kfactor (external flow	4	8		%
103	205	F32+R	Batch 1 alarm: General flow 1-4 channels down	4	1	5	s
104	207	F32+R	Batch 1 alarm: General flow all channels down	4	1	5	s
105	209	F32+R	Batch 1 alarm: calculation API group mismatch	4	2	5	s
106	211	F32+R	Batch 1 alarm: system runtime alarm occured	4	1	5	s
107	213	F32+R	Batch 1 alarm: real time profile out of range when used	4	1	5	s
108	215	F32+R	Batch 1 alarm: measurement out of range temperature body	4	1	5	s
109	217	F32+R	Batch 1 alarm: measurement out of range temperature process	4	2	5	s
110	219	F32+R	Batch 1 alarm: measurement out of range temperature proving	4	8	5	s
111	221	F32+R	Batch 1 alarm: measurement out of range temperature densitometer	4	2	5	s
112	223	F32+R	Batch 1 alarm: measurement out of range pressure process	4	1	2	s
113	225	F32+R	Batch 1 alarm: measurement out of range pressure proving (ext flow)	4	8	5	s
114	227	F32+R	Batch 1 alarm: measurement out of range pressure densitometer	4	2	5	s
115	229	F32+R	Batch 1 alarm: measurement out of range density densitometer	4	2	5	s
116	231	F32+R	Batch 1 alarm: measurement out of range density standard	4	2	5	s
117	233	F32+R	Batch 1 alarm: measurement out of range viscosity external	4	1	5	s
118	235	F32+R	Batch 1 alarm: OVERRIDE applied temperature body	4	1	5	s
119	237	F32+R	Batch 1 alarm: OVERRIDE applied temperature process	4	2	5	s
120	239	F32+R	Batch 1 alarm: OVERRIDE applied temperature proving (ext flowmeter)	4	8	5	s
121	241	F32+R	Batch 1 alarm: OVERRIDE applied temperature densitometer	4	2	5	s
122	243	F32+R	Batch 1 alarm: OVERRIDE applied pressure process	4	1	2	s
123	245	F32+R	Batch 1 alarm: OVERRIDE applied pressure proving (ext flowmeter)	4	8	5	s
124	247	F32+R	Batch 1 alarm: OVERRIDE applied pressure densitometer	4	2	5	s
125	249	F32+R	Batch 1 alarm: OVERRIDE applied density densitometer	4	2	5	s
126	251	F32+R	Batch 1 alarm: OVERRIDE applied density standard	4	2	5	s
127	253	F32+R	Batch 1 alarm: OVERRIDE applied viscosity external	4	1	5	s
128	255	F32+R	Batch 2 average temperature body	4	1		°C
129	257	F32+R	Batch 2 average temperature process	4	2		°C
130	259	F32+R	Batch 2 average temperature proving (external flowmeter)	4	8	2	°C
131	261	F32+R	Batch 2 average temperature densitometer	4	2		°C
132	263	F32+R	Batch 2 average pressure process	4	1	2	bar
133	265	F32+R	Batch 2 average pressure proving (external flowmeter)	4	8	2	bar
134	267	F32+R	Batch 2 average pressure densitometer	4	2		bar
135	269	F32+R	Batch 2 average density densitometer	4	2		kg/m3
136	271	F32+R	Batch 2 average density standard	4	2		kg/m3
137	273	F32+R	Batch 2 avarage BS&W in percent	4	3		cSt or 10-6 m2/s
138	275	F32+R	Batch 2 average Ctl (15°C to process)	4	2		[ ]
139	277	F32+R	Batch 2 average Cpl (0 bar to process)	4	2		[ ]

140	279	F32+R	Batch 2 average Ctl (15°C to standard)	4	2		[ ]
141	281	F32+R	Batch 2 average Cpl (0 bar to standard. always 1)	4	2		[ ]
142	283	F32+R	Batch 2 average Ctl (15°C to densitometer)	4	2		[ ]
143	285	F32+R	Batch 2 average Cpl (0 bar to densitometer)	4	2		[ ]
144	287	F32+R	Batch 2 average Ctl (15°C to proving external flowmeter)	4	8	2	[ ]
145	289	F32+R	Batch 2 average Cpl (0 bar to proving external flowmeter)	4	8	2	[ ]
146	291	F32+R	Batch 2 average temperature standard	4	2		°C
147	293	F32+R	Batch 2 average density process	4	2		kg/m3
148	295	F32+R	Batch 2 average flow proces	4	1		m3/h
149	297	F32+R	Batch 2 average density proving external flowmeter	4	8		kg/m3
150	299	F32+R	Batch 2 average flow proving external flowmeter	4	8		m3/h
151	301	F32+R	Batch 2 average installed Kfactor proving (external flowmeter)	4	8		puls/liter
152	303	F32+R	Batch 2 found new Kfactor proving (external flowmeter)	4	8		puls/liter
153	305	F32+R	Batch 2 difference installed vs new found Kfactor (external flowmeter)	4	8		%
154	307	F32+R	Batch 2 alarm: General flow 1-4 channels down	4	1		s
155	309	F32+R	Batch 2 alarm: General flow all channels down	4	1		s
156	311	F32+R	Batch 2 alarm: calculation API group mismatch	4	2		s
157	313	F32+R	Batch 2 alarm: system runtime alarm occured	4	1		s
158	315	F32+R	Batch 2 alarm: real time profile out of range when used	4	1		s
159	317	F32+R	Batch 2 alarm: measurement out of range temperature body	4	1		s
160	319	F32+R	Batch 2 alarm: measurement out of range temperature process	4	2		s
161	321	F32+R	Batch 2 alarm: measurement out of range temperature proving	4	8		s
162	323	F32+R	Batch 2 alarm: measurement out of range temperature densitometer	4	2		s
163	325	F32+R	Batch 2 alarm: measurement out of range pressure process	4	1	2	s
164	327	F32+R	Batch 2 alarm: measurement out of range pressure proving (extern	4	8		s
165	329	F32+R	Batch 2 alarm: measurement out of range pressure densitometer	4	2		s
166	331	F32+R	Batch 2 alarm: measurement out of range density densitometer	4	2		s
167	333	F32+R	Batch 2 alarm: measurement out of range density standard	4	2		s
168	335	F32+R	Batch 2 alarm: measurement out of range viscosity external	4	1		s
169	337	F32+R	Batch 2 alarm: OVERRIDE applied temperature body	4	1		s
170	339	F32+R	Batch 2 alarm: OVERRIDE applied temperature process	4	2		s
171	341	F32+R	Batch 2 alarm: OVERRIDE applied temperature proving (ext flowmeter)	4	8		s
172	343	F32+R	Batch 2 alarm: OVERRIDE applied temperature densitometer	4	2		s
173	345	F32+R	Batch 2 alarm: OVERRIDE applied pressure process	4	1	2	s
174	347	F32+R	Batch 2 alarm: OVERRIDE applied pressure proving (ext flowmeter)	4	8		s
175	349	F32+R	Batch 2 alarm: OVERRIDE applied pressure densitometer	4	2		s
176	351	F32+R	Batch 2 alarm: OVERRIDE applied density densitometer	4	2		s
177	353	F32+R	Batch 2 alarm: OVERRIDE applied density standard	4	2		s
178	355	F32+R	Batch 2 alarm: OVERRIDE applied viscosity external	4	1		s
179	357	F32+R	Service Value: temperature body	9	1		°C
180	359	F32+R	Service Value: temperature process	9	2		°C
181	361	F32+R	Service Value: temperature proving (external flowmeter)	9	8		°C
182	363	F32+R	Service Value: temperature densitometer	9	2		°C
183	365	F32+R	Service Value: presure process	9	1	2	bar
184	367	F32+R	Service Value: pressure Proving (external flowmeter)	9	8		bar
185	369	F32+R	Service Value: pressure densitometer	9	2		bar
186	371	F32+R	Service Value: density densitometer	9	2		kg/m3
187	373	F32+R	Service Value: density standard	9	2		kg/m3
188	375	F32+R	Service Value: viscosity external	9	1		cSt or 10-6 m2/s
189	377	F32+R	Channel 1 indicative flow velocity in primary section	5	1		m/s
190	379	F32+R	Channel 2 indicative flow velocity in primary section	5	1		m/s
191	381	F32+R	Channel 3 indicative flow velocity in primary section	5	1		m/s
192	383	F32+R	Channel 4 indicative flow velocity in primary section	5	1		m/s

193	385	F32+R	Channel 5 indicative flow velocity in primary section	5	1		m/s
194	387	F32+R	Krohne use: Calibration[0]				[ ]
195	389	F32+R	Krohne use: Calibration[1]				[ ]
196	391	F32+R	Krohne use: Calibration[2]				[ ]
197	393	F32+R	Krohne use: Calibration[3]				[ ]
198	395	F32+R	Krohne use: Calibration[4]				[ ]
199	397	F32+R	Krohne use: Calibration[5]				[ ]
200	399	F32+R	Krohne use: Calibration[6]				[ ]
201	401	F32+R	Krohne use: Calibration[7]				[ ]
202	403	F32+R	Krohne use: Calibration[8]				[ ]
203	405	F32+R	Krohne use: Calibration[9]				[ ]
204	407	F32+R	Krohne use: Calibration[10]				[ ]
205	409	F32+R	Krohne use: Calibration[11]				[ ]
206	411	F32+R	Krohne use: Calibration[12]				[ ]
207	413	F32+R	Krohne use: Calibration[13]				[ ]
208	415	F32+R	Krohne use: Calibration[14]				[ ]
209	417	F32+R	Krohne use: Calibration[15]				[ ]
210	419	F32+R	Krohne use: Calibration[16]				[ ]
211	421	F32+R	Krohne use: Calibration[17]				[ ]
212	423	F32+R	Krohne use: Calibration[18]				[ ]
213	425	F32+R	Krohne use: Calibration[19]				[ ]
214	427	F32+R	Standard Density calculated from the BSW0300.dat	3			kg/m3
215	429	F32+R	Process Density calculated from the BSW0300.dat	3			kg/m3
216	431	F32+R	MP103 FreqOutp. Max_freq [hz]	7			Hz
217	433	F32+R	MP103 FreqOutp. Min_unit	7			[ ]
218	435	F32+R	MP103 FreqOutp. Max_unit	7			[ ]
219	437	F32+R	MP103 FreqOutp. averaging delay time [s]	7			s
220	439	F32+R	Service Value: BS&W Input	9			[ ]
221	441	F32+R	AirBuoyancy	3			kg/m3
222	443	F32+R	LiterWeight	3			kg/m3
223	445	F32+R	Weight in air	3			kg
224	447	F32+R	Current BS&W	3			%
225	449	F32+R	Batch stop: Average Temperature Body	4	1		℃
226	451	F32+R	Batch stop: Average Temperature Process	4	2		℃
227	453	F32+R	Batch stop: Average Temperature External	4	8		℃
228	455	F32+R	Batch stop: Average Temperature Density	4	2		℃
229	457	F32+R	Batch stop: Average Pressure Process	4	1	2	bar
230	459	F32+R	Batch stop: Average Pressure External	4	8		bar
231	461	F32+R	Batch stop: Average Pressure Density	4	2		bar
232	463	F32+R	Batch stop: Average Density	4	2		kg/m3
233	465	F32+R	Batch stop: Average Density Standard	4	2		kg/m3
234	467	F32+R	Batch stop: Average External Viscosity Dyn.	4	1		cSt or 10-6 m2/s
235	469	F32+R	Batch stop: Average Ctl (15øC to process)	4	2		[ ]
236	471	F32+R	Batch stop: Average Cpl (0bar to process)	4	2		[ ]
237	473	F32+R	Batch stop: Average Ctl (15øC to standard)	4	2		[ ]
238	475	F32+R	Batch stop: Average Cpl (0bar to standard: 1.0)	4	2		[ ]
239	477	F32+R	Batch stop: Average Ctl (15øC to densito)	4	2		[ ]
240	479	F32+R	Batch stop: Average Cpl (0bar to densito)	4	2		[ ]
241	481	F32+R	Batch stop: Average Ctl (15øC to external)	4	8		[ ]
242	483	F32+R	Batch stop: Average Cpl (0bar to external)	4	8		[ ]
243	485	F32+R	Batch stop: Average Temperature Standard	4	2		℃
244	487	F32+R	Batch stop: Average Density Process	4	2		kg/m3
245	489	F32+R	Batch stop: Average Actual Flow	4	1		m3/h

246	491	F32+R	Batch stop: Average Density external	4	8		kg/m3
247	493	F32+R	Batch stop: Average Flow external	4	8		m3/h
248	495	F32+R	Batch stop: Average Inst. K-Factor external	4	8		[ ]
249	497	F32+R	Batch stop: Average New K-Factor external	4	8		[ ]
250	499	F32+R	Batch stop: Average Diff. K-Factor Inst.. New	4	8		%

8.6 Field 5 (Read only Double Field)

This data is read only and can be accessed with Modbus function 3 and 4 in Modbus slave mode and with functions 6 and 16 in Modbus master mode. A double is a float 64 bit type

By default the start addresses are mapped to address **6000** (default value)

start address NotModiconComp	start address ModiconComp	Type+Access	Description	Level	Level	Level	Remark
1	1	F64+R	Resetable totaliser: proces sum	1			Liter
2	5	F64+R	Flow process	1			m3/h
3	9	F64+R	Sound velocity average	1			m/s
4	13	F64+R	Resetable totaliser: standard sum	2			liter
5	17	F64+R	Flow standard	2			m3/h
6	21	F64+R	Resetable totaliser: mass sum	2			kg
7	25	F64+R	Flow mass	2			ton/hr
8	29	F64+R	Reserved				
9	33	F64+R	Resetable totaliser: proces forward	1			liter
10	37	F64+R	Resetable totaliser: proces reverse	1			liter
11	41	F64+R	Resetable totaliser: standard forward	2			liter
12	45	F64+R	Resetable totaliser: standard reverse	2			liter
13	49	F64+R	Resetable totaliser: mass forward	2			kg
14	53	F64+R	Resetable totaliser: mass reverse	2			kg
15	57	F64+R	Resetable totaliser: external flow meter proces	8			liter
16	61	F64+R	Resetable totaliser: external flow meter standard	8			liter
17	65	F64+R	Resetable totaliser: external flow meter mass	8			kg
18	69	F64+R	Non resetable totaliser: proces sum	1			m3
19	73	F64+R	Non resetable totaliser: proces forward	1			m3
20	77	F64+R	Non resetable totaliser: proces reverse	1			m3
21	81	F64+R	Non resetable totaliser: standard sum	2			m3
22	85	F64+R	Non resetable totaliser: standard forward	2			m3
23	89	F64+R	Non resetable totaliser: standard reverse	2			m3
24	93	F64+R	Non resetable totaliser: mass sum	2			ton
25	97	F64+R	Non resetable totaliser: mass forward	2			ton
26	101	F64+R	Non resetable totaliser: mass reverse	2			ton

8.7 Field 6 (Read/Write Float Field)

In slave mode write to field by function 16, read from field by function 3.
In Master mode write to field by function 3, read from field by function 16

NOTE that for explanation on how to handle writing to these parameters:
see chapters
7.6 How data is written to the float field
8.10 Explanation of Data Available to Modbus

By default the start addresses are mapped to address **7500** (default value)

start address NotModiconComp	start address ModiconComp	Type+Access	Description	Level	Level	Level	Remark
1	1	F32+R	API: time to update a parameter (read only)	5			s, max=30s
2	3	F32+RW	API: correction type	6	2		0,1,2
3	5	F32+RW	API: density standard type	6	2		0,1,2
4	7	F32+RW	API: fluid type	6	2		0,1,2,3,4,5
5	9	F32+RW	API: standard density crude (fluid type 0)	6	2		610.5..1075.0 kg/m3
6	11	F32+RW	API: standard density gasoline (fluid type 1)	6	2		653.0.. 770.0 kg/m3
7	13	F32+RW	API: standard density trans.area (fluid type 2)	6	2		770.5.. 787.5 kg/m3
8	15	F32+RW	API: standard density jet group (fluid type 3)	6	2		788.0.. 838.5 kg/m3
9	17	F32+RW	API: standard density fuel oil (fluid type 4)	6	2		839.0..1075.0 kg/m3
10	19	F32+RW	API: standard density free fill (fluid type 5)	6	2		500.0..2000.0 kg/m3
11	21	F32+RW	API: free fill K0	6	2		$-10^{e}9$ .. $10^{e}9$
12	23	F32+RW	API: free fill K1	6	2		$-10^{e}9$ .. $10^{e}9$
13	25	F32+RW	API: free fill K2	6	2		$-10^{e}9$ .. $10^{e}9$
14	27	F32+RW	API: temperature standard	6	2		0-30℃
15	29	F32+RW	Standard correction selection	6	2		0,1,2,3
16	31	F32+RW	ASTM-IP standard density	6	2		600..1200 kg/m3
17	33	F32+RW	LPG/ULHC standard density	6	2		500..700 kg/m3
18	35	F32+RW	LPG equlibrium pressure / ULHC standard maximum error	6	2		0.00001..25
19	37	F32+RW	Reserved (Simulated flow. Only in dummy mode)				-125..125%
20	39	F32+RW	Reserved				
21	41	F32+R	EXT: time to update a parameter (read only)	5	8		s, max 30 sec
22	43	F32+RW	EXT: external Kfactor	6	8		puls/liter
23	45	F32+RW	EXT/API: parameters changeable under flowing condition or < lfc	6	8		0=always, 1=only < low flow cut-off
24	47	F32+RW	MeterFactor Positive Flow (if enabled in clnt0300.dat)	6	1		0.9..1.1
25	49	F32+RW	Meterfactor Negative Flow (if enabled in clnt0300.dat)	6	1		0.9..1.1
26	51	F32+RW	Reserved				
27	53	F32+RW	Reserved				
28	55	F32+RW	Reserved				
29	57	F32+RW	Reserved				

30	59	F32+RW	UFP batch control: **Normal:** Setup=9 (if UFP batch1 status batch=0 is no batch) Cancel=5 (if UFP batch1 status batch=1 is set-up) Start batch=119 (if UFP batch1 status batch=1 is set-up) End batch=229 (if UFP batch1 status batch=1 is running) reset print=1009 (if UFP batch1 status batch=5…10 printing) Confirm ticket=779 (if UFP batch1 status batch=10 is confirm) **Continuous pipe line measurement, ticket on demand:** End with no reset values=559 (if UFP batch1 status batch is not printing) End with reset values=229 (if UFP batch1 status batch is not printing) Reset printing=1009 (if UFP batch1 status batch 5…10 is printing) 559 and 229 have automatic freeze of batch values (on Modbus) for a maximum of 30 seconds (see also Boolean 2075)	6	2		5…1009 On command value input: Return 0 if not accepted Return 1 if accepted Reset to -99999 after 5 seconds
31	61	F32+R	Solartron1: time to update a parameter (read only)	5	2		s, max 30 sec
32	63	F32+RW	Solartron1 K0	6	2		device calib. Param.
33	65	F32+RW	Solartron1 K1	6	2		device calib. Param.
34	67	F32+RW	Solartron1 K2	6	2		device calib. Param.
35	69	F32+RW	Solartron1 K18	6	2		device calib. Param.
36	71	F32+RW	Solartron1 K19	6	2		device calib. Param.
37	73	F32+RW	Solartron1 K20A	6	2		device calib. Param.
38	75	F32+RW	Solartron1 K20B	6	2		device calib. Param.
39	77	F32+RW	Solartron1 K21A	6	2		device calib. Param.
40	79	F32+RW	Solartron1 K21B	6	2		device calib. Param.
41	81	F32+R	Solartron2: time to update a parameter (read only)	5	2		s, max 30 sec
42	83	F32+RW	Solartron2 K0	6	2		device calib. Param.
43	85	F32+RW	Solartron2 K1	6	2		device calib. Param.
44	87	F32+RW	Solartron2 K2	6	2		device calib. Param.
45	89	F32+RW	Solartron2 K18	6	2		device calib. Param.
46	91	F32+RW	Solartron2 K19	6	2		device calib. Param.
47	93	F32+RW	Solartron2 K20A	6	2		device calib. Param.
48	95	F32+RW	Solartron2 K20B	6	2		device calib. Param.
49	97	F32+RW	Solartron2 K21A	6	2		device calib. Param.
50	99	F32+RW	Solartron2 K21B	6	2		device calib. Param.
51	101	F32+R	Sarasota1: time to update a parameter (read only)	5	2		s, max 30 sec
52	103	F32+RW	Sarasota1 K	6	2		device calib. Param.
53	105	F32+RW	Sarasota1 T0	6	2		device calib. Param.
54	107	F32+RW	Sarasota1 D0	6	2		device calib. Param.
55	109	F32+RW	Sarasota1 Nt	6	2		device calib. Param.
56	111	F32+RW	Sarasota1 Np	6	2		device calib. Param.
57	113	F32+RW	Sarasota1 Tcal	6	2		device calib. Param.
58	115	F32+RW	Sarasota1 Pcal	6	2		device calib. Param.
59	117	F32+R	Sarasota2: time to update a parameter (read only)	5	2		s, max 30 sec
60	119	F32+RW	Sarasota2 K	6	2		device calib. Param.
61	121	F32+RW	Sarasota2 T0	6	2		device calib. Param.
62	123	F32+RW	Sarasota2 D0	6	2		device calib. Param.
63	125	F32+RW	Sarasota2 Nt	6	2		device calib. Param.
64	127	F32+RW	Sarasota2 Np	6	2		device calib. Param.
65	129	F32+RW	Sarasota2 Tcal	6	2		device calib. Param.
66	131	F32+RW	Sarasota2 Pcal	6	2		device calib. Param.
67	133	F32+RW	Input in UFP (if enabled): temperature body	6	1		℃
68	135	F32+RW	Input in UFP (if enabled): temperature process	6	2		℃
69	137	F32+RW	Input in UFP (if enabled): temperature proving. external flowmet	6	8		℃
70	139	F32+RW	Input in UFP (if enabled): temperature densitometer	6	2		℃
71	141	F32+RW	Input in UFP (if enabled): pressure process	6	2		bar

72	143	F32+RW	Input in UFP (if enabled): pressure proving. external flowmeter	6	8		bar
73	145	F32+RW	Input in UFP (if enabled): pressure densitometer	6	2		bar
74	147	F32+RW	Input in UFP (if enabled): density densitometer	6	2		kg/m3
75	149	F32+RW	Input in UFP (if enabled): density standard	6	2		kg/m3
76	151	F32+RW	Input in UFP (if enabled): viscosity dynamic	6	1		cSt or 10-6 m2/s
77	153	F32+RW	System time UFP adjustment (see B2230 to enable write)	6	4		-7200…7200 s
78	155	F32+R	OVERRIDE: Time to update a parameter (read only)	5			s, max 30 sec
79	157	F32+RW	OVERRIDE if set is enabled: temperature body to override	6	1		℃
80	159	F32+RW	OVERRIDE if set is enabled: temperature process to override	6	2		℃
81	161	F32+RW	OVERRIDE if set is enabled: temperature proving to override	6	8		℃
82	163	F32+RW	OVERRIDE if set is enabled: temperature densitometer to override	6	2		℃
83	165	F32+RW	OVERRIDE if set is enabled: pressure process to override	6	1	2	bar
84	167	F32+RW	OVERRIDE if set is enabled: pressure proving to override	6	8		bar
85	169	F32+RW	OVERRIDE if set is enabled: pressure densitometer to override	6	2		bar
86	171	F32+RW	OVERRIDE if set is enabled: density densitometer to override	6	2		kg/m3
87	173	F32+RW	OVERRIDE if set is enabled: density standard to override	6	2		kg/m3
88	175	F32+RW	OVERRIDE if set is enabled: viscosity dynamic to override	6	1		cSt or 10-6 m2/s
89	177	F32+RW	Batch reference number for internal batch ticket	6	4		[ ]
90	179	F32+RW	Krohne use: Calibration volume				[ ]
91	181	F32+R	Input in UFP (if enabled): BS&W Input	6	3		%
92	183	F32+RW	Reserved				
93	185	F32+RW	Reserved				
94	187	F32+RW	Reserved				
95	189	F32+RW	Batch Float Start Value 1 batch ticket print code 750	6	4		To print in the batch ticket
96	191	F32+RW	Batch Float Start Value 2 batch ticket print code 751	6	4		To print in the batch ticket
97	193	F32+RW	Batch Float Start Value 3 batch ticket print code 752	6	4		To print in the batch ticket
98	195	F32+RW	Batch Float Start Value 4 batch ticket print code 753	6	4		To print in the batch ticket
99	197	F32+RW	Batch Float Start Value 5 batch ticket print code 754	6	4		To print in the batch ticket
100	199	F32+RW	Batch Float Stop Value 1 batch ticket print code 755	6	4		To print in the batch ticket
101	201	F32+RW	Batch Float Stop Value 2 batch ticket print code 756	6	4		To print in the batch ticket
102	203	F32+RW	Batch Float Stop Value 3 batch ticket print code 757	6	4		To print in the batch ticket
103	205	F32+RW	Batch Float Stop Value 4 batch ticket print code 758	6	4		To print in the batch ticket
104	207	F32+RW	Batch Float Stop Value 5 batch ticket print code 759	6	4		To print in the batch ticket
105	209	F32+RW	Reserved				
106	211	F32+RW	OVERRIDE if set is enabled: BS&W percentage to override	6	3		%
107	213	F32+RW	Set number of values (FIFO) for Gross Flow Running Average.	6	1		2…512
108	215	F32+R	Batch stop: Alarm 1-4 channels down	4	1	5	s
109	217	F32+R	Batch stop: Alarm all channels down	4	1	5	s
110	219	F32+R	Batch stop: Alarm API group mismatch	4	2	5	s
111	221	F32+R	Batch stop: Alarm system runtime	4	2	5	s
112	223	F32+R	Batch stop: Alarm Profile oor	4	1	5	s
113	225	F32+R	Batch stop: Alarm Body Temperature oor	4	1	5	s
114	227	F32+R	Batch stop: Alarm Process Temperature oor	4	1	2	s
115	229	F32+R	Batch stop: Alarm External Temperature oor	4	8	5	s
116	231	F32+R	Batch stop: Alarm Densito Temperature oor	4	2	5	s
117	233	F32+R	Batch stop: Alarm Process Pressure oor	4	2	5	s
118	235	F32+R	Batch stop: Alarm External Pressure oor	4	8	5	s
119	237	F32+R	Batch stop: Alarm Densito Pressure oor	4	2	5	s
120	239	F32+R	Batch stop: Alarm Density oor	4	2	5	s
121	241	F32+R	Batch stop: Alarm Standard Density oor	4	2	5	s
122	243	F32+R	Batch stop: Alarm External Viscosity oor	4	8	5	s
123	245	F32+R	Batch stop: Override Body Temperature	4	1	5	s
124	247	F32+R	Batch stop: Override Process Temperature	4	2	5	s

125	249	F32+R	Batch stop: Override External Temperature	4	8	5	s
126	251	F32+R	Batch stop: Override Density Temperature	4	2	5	s
127	253	F32+R	Batch stop: Override Process Pressure	4	2	5	s
128	255	F32+R	Batch stop: Override External Pressure	4	8	5	s
129	257	F32+R	Batch stop: Override Densito Pressure	4	2	5	s
130	259	F32+R	Batch stop: Override Density	4	2	5	s
131	261	F32+R	Batch stop: Override Standard Density	4	2	5	s
132	263	F32+R	Batch stop: Override External Viscosity	4	1	5	s
133	265	F32+R	Batch stop: Lowest measured Temperature (for high viscosity applic.)	4	2	5	℃
134	267	F32+R	Batch stop: deviation % (worst case estimate due to batch alarms)	5	4		%
135	269	F32+R	Batch live: deviation % (worst case estimate due to batch alarms) during batch	5	4		%
136	271	F32+R	Kinemat.Viscosity - temp corrected - (for ext. visc. input applic.)	1			cSt or 10-6 m2/s
137	273	F32+R	Check Modbus totalisers and batch 1+2 values on hold (see Bool2075)	4			s, max 30s

8.8 Field 6 (Read Only ASCII Field 8 characters)

This data is read only and can be accessed with Modbus function 3 and 4 in Modbus slave mode and with functions 6 and 16 in Modbus master mode. This ASCII field is a 64 bit type.

By default the start addresses are mapped to address 4**000** (default value)

start address NotModiconComp	start address ModiconComp	Type+Access	Description	Level	Level	Level	Remark
1	1	S32+RW	Ascii32 String Combination of four 8 char strings for writing one long string to one address (batch ticket print code 2221 2222 2223 2224)	4	6		To print in the batch ticket
1	1	S8+RW	Ascii8 String 1 (batch ticket print code 2221)	4	6		To print in the batch ticket
2	5	S8+RW	Ascii8 String 2 (batch ticket print code 2222)	4	6		To print in the batch ticket
2	9	S8+RW	Ascii8 String 3 (batch ticket print code 2223)	4	6		To print in the batch ticket
3	13	S8+RW	Ascii8 String 4 (batch ticket print code 2224)	4	6		To print in the batch ticket

8.9 Field 6 (Read Write ASCII Field 16 characters)

This data is read only and can be accessed with Modbus function 3 and 4 in Modbus slave mode and with functions 6 and 16 in Modbus master mode. This ASCII field is a 128 bit type.

Starting addresses are mapped to address **14000** (default

start address NotModiconComp	start address ModiconComp	Data Type	Description	Level	Level	Level	Remark
1	1	S16+RW	Ascii16 String 5 (batch ticket print code 2261)	4	6		To print in the batch ticket
2	9	S16+RW	Ascii16 String 6 (batch ticket print code 2262)	4	6		To print in the batch ticket
3	17	S16+RW	Ascii16 String 7 (batch ticket print code 2263)	4	6		To print in the batch ticket

4	25	S16+RW	Ascii16 String 8 (batch ticket print code 2264)	4	6		To print in the batch ticket
5	33	S16+R	Ascii16 String 9 Serial number	1			
6	41	S16+R	Ascii16 String 10 Tag number	1			

8.10 Explanation of Data Available to Modbus

Basic Flow measurement WARNING
This warning occurs if 1…4 paths fail, but the system works within specifications.
Possible sources of the warning are over range, path failure, deviation in sound velocity or communication failure.

Basic Flow measurement ERROR
This error occurs if all paths fail.
Possible sources of the error are over range, path failure, deviation in sound velocity, communication failure

System Runtime WARNING
This warning is caused by system failures or failures from the Modbus driver. See system messages
These failures will not influence the flow measurement.
The last warning number is saved into the integer and long integer field *System Runtime warning/error number…*

System Runtime ERROR
This error is caused by system failures. See system messages
These failures might influence the flow measurement.
The last error number is saved into the integer and long integer field *System Runtime warning/error number*.

System Set-up WARNING
This error is caused by insufficient statistical data during set-up. Default data is used until enough statistical information is recorded (under normal conditions).
In this case the warning is self-resolving.
Another possibility is an improper initialisation of the Modbus driver (Modbus will not be accessible). In this case, the warning remains active.
The integer and long integer *System Set-up warning/error number* contains the error number.
- See the Altosonic-V Operating Manual

System Set-up ERROR
This error is caused by an improper initialisation. The Modbus driver may be initialised successfully.
The integer and long integer *System Set-up warning/error number* contains the error number.
- See the Altosonic-V Operating Manual

Resetable totaliser Rollover occurred
Status for if the totaliser exceeds the value of 1^E9 liter, the totaliser is decreased with 1^E9 and the totaliser Rollover occurred Boolean is set.

Resetable totaliser Reset occurred
Status for if the totaliser has been reset (by Modbus, manually, or relay contact).

Flow direction
Status for the current flow direction: 0=forward direction, and 1=reverse direction.

Algo. Basic flow on output
Status for calculation with the basic algorithm.

Algo. Reyn. Correction on output
Status for calculation with the basic algorithm, including Reynolds correction algorithm.

Swirl correction on output
Status for calculation with the basic algorithm, including Swirl correction algorithm.

Temperature correction on output
Status for correction for tube expansion caused by temperature deviation.

Standard volume on output
Status for the corrected/calculated standard conditions of 15 °C and 1 Bar.

Correction parameters HOLD. Due to flow deviation
In case of large flow deviation the correction parameters are 'frozen' until enough statistical information is available to perform a reliable correction.

Overrange data sensor 1…5
This Boolean exists for each ultrasonic channel.
If the flow converter measuring the flow is out of range (±125%) this Boolean is set.

Path failure sensor 1…5
This Boolean exists for each ultrasonic channel.
If the flow converter detects an ultrasonic path failure, this Boolean is set.
Path failure is mostly due to gas, but might be caused by an obstructive solid particle.

Deviation in sound velocity sensor 1…5
This Boolean exists for each ultrasonic channel.
The measurement program calculates the mean sound velocity out of the three most nearby values and checks all channels on their deviation to this mean value.
If the deviation is too large this Boolean is set.

Communication failure sensor 1…5
This Boolean exists for each ultrasonic channel.
The data transfer with the flow converter is tested with a data validation check, if this test is negative this Boolean is set.

Real profile sampling on hold
Warning that Real Profile Sampling is on hold due to channel failure (1..5), extreme flow deviations or low flow.

External Viscosity meter, Temperature external densito meter, Pressure external densito meter, Temperature external flow meter, Pressure external flow meter out of range
Warning that the specific reading is out of limits (set for low and high alarm).

Acknowledge_flags_field_0
- See chapter 7.5 for more information on this Boolean.

General_acknowledge_flags_field_0
- See chapter 7.5 to for more information on this Boolean.

Reset All errors
This Boolean can be set to reset/update all errors, occurred under runtime condition.
This Boolean is self-resetting.

Reset Totalisers and All Errors
This Boolean can be set to reset all the totalisers **AND** to reset/update all errors **AND** process time, occurred under runtime condition. (Action is performed if Boolean is set to 1).
This Boolean is self-resetting.

Flow actual /Flow standard / Flow mass
Value for the flow available as scaled integer, scaled long integer, float and double.
The floating-point numbers represent the flow in m^3/hr or kg/m3, the scaled integers are scaled to the full-scale value (-32768 … +32767 ⇔ -125%… +125%).

Sound velocity
Value for the sound velocity, available as scaled integer, scaled long integer, float and double.
The floating-point numbers represent the sound velocity in m/s, the scaled integers are scaled to 32767 (scaled 0...32767 ⇔ 0...3276.7 m/s).

Flow of path 1…5
Available as scaled integer and float, these values represent internal UFP-V units.

Sound velocity of path 1...5
Available as scaled integer and float.
The floating-point numbers represent the sound velocity in m/s, the scaled integers are scaled to 32767 (scaled 0…32767 ⇔ 0...3276.7 m/s).

System Set-up warning/error number
This value contains the number of the last occurred system set-up warning or system set-up error.

System Runtime warning/error number
This value contains the number of the last occurred system runtime warning or system runtime error.

System messages 1…64
Each system message corresponds to a bit in this integer value.
If a system message occurs, the accompanying bit is set, the bit remains set until the *Reset_All_Errors* Boolean is set.
The messages are numbered from the least significant bit to the most significant bit.
Integer values contains the occurred-status of 16 messages,
Long integers contain the occurred-status of 32 messages,

Proces/standard/mass Totaliser
Sum of forward and reverse for the proces/standard/mass totalisers, available as long integer and double.
All data types represents the totaliser in Liters (volumes) or (mass) kg, the totalisers have a rollover at 1^E9. Is resetable.

Forward proces/standard/mass Totaliser
Values for the forward totalisers, available as long integer and double. All data types represents the forward totalisers in Liters(volumes) or (mass) kg, the totalisers have a rollover at 1^E9.
Is resetable.

Reverse proces/standard/mass Totaliser
Values for the reverse totalisers, available as long integer and double. All data types represents the forward totalisers in Liters(volumes) or kg(mass), the totalisers have a rollover at 1^E9.
Is resetable.

Remaining HOLD time on real-profile sampling
In case of large flow deviation or low flow, the real-profile sampling is on hold until the flow has stabilised. Until then no new real-profile is sampled

API: Time to update a parameter (read only)
Time remaining to update a float in the API application field. Starts at 20 seconds remaining time after the Boolean *2201 API enable writing data* and counting down to 0 seconds. When at 0 seconds the Boolean 2201 will reset (0) and it is not possible to write to the application field.

API: Correction type
The type of correction to calculate the standard volume and/or mass.
0: Disable, no standard volume or mass will be calculated.
1: Standard volume/mass by API 2540
2: Mass measurement by process density (measured by densito meter)

API: Density standard type
When the correction type is 1 (Standard volume/mass by API2540):
The type of density standard (at temperature and pressure standard)
0: Fill in manually
1: Calculated from process density ((measured by densito meter)
2: On AD/Modbus input

API: Fluid type
When the correction type is 1 (Standard volume/mass by API2540):
The type of fluid:
0: Crude
1: Gasoline
2: Trans.area
3: Jet group
4: Fuel oil
5: Free fill

API: Stand. Density crude/gasoline/trans.area/jetgroup/fuel oil/free fill
When the correction type is 1 (Standard volume/mass by API2540):
Limits for 15°C standard

Crude	: 610.5..1075.0 kg/m3
Gasoline	: 653.0.. 770.0 kg/m3
Trans.area	: 770.5.. 787.5 kg/m3
Jet group	: 788.0.. 838.5 kg/m3
Fuel oil	: 839.0..1075.0 kg/m3
free fill	: 500.0..2000.0 kg/m3

When a value is outside the limits the UFP-V system will not accept the value

API: Free Fill K0/1/2
When the correction type is 1 (Standard volume/mass by API2540) and Fluid type is 5 (free fill):
K0…K2 are factors used in the API calculation.
Limits are $-10^{e}9$ .. $10^{e}9$

API: Temperature standard
When the correction type is 1 (Standard volume/mass by API2540):
The standard temperature is the temperature at standard conditions.
Limits are 0..30°C

Batch averages 1 on temperatures, pressures, densities, and correction factors
On reset Totalisers (or Boolean set to 1 only) new batch averages are made for a maximum of 1500 days, after 1500 days the averages are no longer calculated.

Batch averages 2 on temperatures, pressures, densities, and correction factors
Boolean set to 1 only new batch averages are made for a maximum of 1500 days, after 1500 days the averages are no longer calculated.

8.11 The System Messages

The system messages contains the system runtime warnings and alarms. They are stored as bits into the integer data. Each system message is packed as one message per bit of the integer. The message is active if the accompanying bit is one. The messages are numbered from the least significant bit to the most significant bit.

The status of the system is divided into:

- System Runtime Warnings. These are caused by system failures. These failures will not influence the flow measurement.
- System Runtime Alarms. These are caused by system failures. These failures might influence the flow measurement.
  Identified System Runtime Errors are numbered 1 to 60 are:

Identified System Runtime Errors are numbered 1 to 60, A = alarm, W = warning:

Error no.	In function	Problem	Consequence
A : 1	Get RS485 data from converters	Overrun, missed data	Missed data, message
A : 2	Self test	Error in self-test	Non-reliable memory
A : 3	Batch start / stop	Error during saving files of start or stop	File lost but ticket is made
A : 4	Profile correction (REAL)	Error in state_correction	Attempt divide to by zero
W: 5	Read Backup all files	Error in reading backup file	Possible loss of backup file
W: 6	Switching disk	Error in finding a drive	Message
W: 7	System time	A notice that the system time was adjusted manually or by Modbus.	No consequence for totalisers or proces time, only on ticket time
A: 8	CRC checksum Executable	Executable is corrupted or not certified version 03.00.50.00 and higher	Load new executable. Contact Krohne service department
A: 9	Batch status backup	Status file corrupt	Possible loss of batch status
W: 10	Override values files	Error in opening/closing override value file	Override values not stored but still in use
A: 11	Batch totaliser backup	Totaliser backup-file corrupt	File lost , message
A: 12	Batch average backup	Average backup-file corrupt	File lost, message
A: 13	Batch ticket create	Error in creating batch ticket file	Ticket itself is made for printing but lost during saving
W: 14	Opening file (for update)	Error in opening REAL file	File lost, message
W: 15	Closing file (for update)	Error in closing REAL file	File lost, message
W: 16	API settings	Error in file, defaults are loaded and saved	Old settings lost
W: 17	Batch 2	A alarm on batch 2 file (Batch 2 is only used through Modbus with a Scada system)	File lost, message
W: 18	Check free disk-space	Error dos_getdiskfree() call	Time-out function 30 s
W: 19	Check free disk-space	Low on disk-space	Time-out function 30 s
W: 20	Ad card overrun	The requested AD card is not noticed	Solve the problem
W: 21	Opening file (for update)	Error opening API table file	File lost, message
W: 22	Value check	1 or more API values defaulted	Check the installed parameters
W: 23	Opening file (for update)	Error opening external flow meter file	File lost, message
W: 24	Value check	Default external flow meter K-factor	Check the installed K-factor
W: 25	Counter input	Unable to read Counter value	Read on next entry
A : 26	Calibration MP103 card	MPCA File corrupt	Install backup
A : 27	Calibration AD card	File corrupt	Install backup
A : 28	Calibration data Densito Cells	File corrupt	Automatic install of default values Set the correct values on-line
A : 29	Batch ticket currently saved	A Requested batch ticket not available for printing	A ticket by that name was not saved or had a previous save error
A : 30	Batch ticket	CRC error in a Batch ticket	A ticket was not saved correctly or was changed manually
W: 31	Read batch ticket previously saved	A Requested batch ticket not available for printing	A ticket by that name was not saved or had a previous save error
W : 32	Batch ticket close file	Error in closing a ticket file	Ticket file not closed , probably because it could not be opened

See for the communication runtime errors also the **ALTOSONIC V Modbus Manual.**

Err no.	In function	Problem	Consequence
W: 33	Modbus master	Poll block not send due to transmit error	
W: 34	Modbus master	Poll block response time-out occurred	
W: 35	Modbus master	Invalid Slave ID in response	
W: 36	Modbus master	Invalid function in response	
W: 37	Modbus master	Response not correct	
W: 38	Modbus master	Error handling function 1,2	
W: 39	Modbus master	Error handling function 3,4	
W: 40	Modbus master	Error handling function 5	
W: 41	Modbus master	Error handling function 6	
W: 42	Modbus master	Error handling function 15	
W: 43	Modbus master	Error handling function 16	
W: 44	Modbus master	Exception received	
W: 45	Modbus master	Error unpacking Boolean data	
W: 46	Modbus master	Error unpacking integer data	
W: 47	Modbus master	Error unpacking long integer data	
W: 48	Modbus master	Error unpacking float data	
W: 49	Modbus master	Error unpacking double data	
W: 50	Modbus master/slave	Error incorrect message length	
W: 51	Modbus master/slave	Invalid CRC or LRC received	
W: 52	Modbus master/slave	Error receive buffer saturated	
W: 53	Modbus master/slave	UART error (parity, framing, overrun)	
W: 54	Modbus master/slave	Transmit buffer not empty for new transmission	
W: 55	Modbus slave	Unsupported function requested	
W: 56	Modbus slave	Unsupported register(s) requested	
W: 57	Modbus slave	Requested data Level and function mismatch	
W: 58	Modbus slave	Too many data point (registers) requested	
W: 59	Modbus slave	Error unpacking received data	
W: 60	Modbus slave	Broadcast not allowed	

9 Appendices

9.1 Appendix A: Time out values

The character length lies between 9 and 12 bits

The UFP-V determines the time between two bytes to recognise a communication failure or the end of a message. UFP-V discriminates between a timeout between 2 bytes and a timeout after the last byte, which occurs at the end of a message.

The time between two bytes is measured with a resolution of ±100 us.
To detect the timeout state (end of message) a timer is incremented every millisecond. A received byte will reset the timer. Every millisecond the timer value will be checked for a timeout value, when it will exceed a defined value it will mark the last received byte as *end of message*.

Notice that the serial communication is a asynchrony process with respect to the used timer interrupt, therefore a 'jitter' of 1 ms must be taken into account.

Modbus defined timeout values for every baud rate with N number of bytes:

Baud rate	9 bit		10 bit		11 bit		12 bit	
Timeout chars	3.5	4.0	3.5	4.0	3.5	4.0	3.5	4.0
1200	26.25 ms	30 ms	29.17 ms	33.34 ms	32.08 ms	36.67 ms	35.00 ms	40 ms
2400	13.16 ms	15 ms	14.58 ms	6.67 ms	16.04 ms	18.33 ms	17.50 ms	20 ms
4800	6.56 ms	7.5 ms	7.29 ms	8.33 ms	8.02 ms	9.17 ms	8.75 ms	10 ms
9600	3.28 ms	3.75 ms	3.65 ms	4.16 ms	4.01 ms	4.58 ms	4.38 ms	5 ms
19200	1.64 ms	1.88 ms	1.82 ms	2.08 ms	2.01 ms	2.29 ms	2.19 ms	2.5 ms

The maximum time to detect a timeout (end of message) used in UFP-V:

Baud rate	9	10	11	12
1200	28…29 ms	31…32 ms	33…34 ms	36…37 ms
2400	14…15 ms	15…16 ms	16…17 ms	18…19 ms
4800	6…7 ms	7…8 ms	8…9 ms	9…10 ms
9600	3…4 ms	3…4 ms	4…5 ms	4…5 ms
19200	2…3 ms	2…3 ms	2…3 ms	2…3 ms

The maximum time between 2 characters in a message (GAP) used in UFP-V:

Baud rate	9	10	11	12
1200	28.2 ms	31.3 ms	34.4 ms	37.5 ms
2400	14.1 ms	15.6 ms	17.2 ms	8.8 ms
4800	7.0 ms	7.8 ms	8.6 ms	9.4 ms
9600	3.5 ms	3.9 ms	4.3 ms	4.7 ms
19200	1.8 ms	1.95 ms	2.2 ms	2.4 ms

9.2 Appendix B: LRC Generation

(As taken from the website: www.modicon.com/techpubs/crc7.html)

The Longitudinal Redundancy Check (LRC) field is one byte, containing an eight-bit binary value. The LRC value is calculated by the transmitting device, which appends the LRC to the message. The receiving device recalculates an LRC during receipt of the message, and compares the calculated value to the actual value it received in the LRC field. If the two values are not equal, an error results. The LRC is calculated by adding together successive eight-bit bytes in the message, discarding any carries, then two's complementing the result. The LRC is an eight-bit field, therefore each new addition of a character that would result in a value higher than 255 decimal simply rolls over the field's value through zero. Because there is no ninth bit, the carry is discarded automatically.

Generating an LRC
Step 1 :
Add all bytes in the message, excluding the starting colon and ending CRLF. Add them into an eight-bit field, so that carries will be discarded.
Step 2
Subtract the final field value from FF hex (all 1's), to produce the ones-complement.
Step 3
Add 1 to produce the two's-complement.

Placing the LRC into the Message
When the the eight-bit LRC (two ASCII characters) is transmitted in the message, the high order character will be transmitted first, followed by the low order character-e.g., if the LRC value is 61 hex (0110 0001):

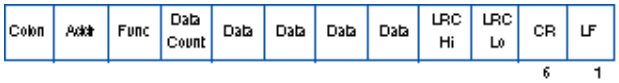


Figure 8 LRC Character Sequence

Example
An example of a C language function performing LRC generation is shown below.
The function takes two arguments:
unsigned char *auchMsg ; A pointer to the message buffer containing binary data to be used for generating the LRC
unsigned short usDataLen ; The quantity of bytes in the message buffer. The function returns the LRC as a type unsigned char.

LRC Generation Function

```
static unsigned char LRC(auchMsg, usDataLen)
unsigned char *auchMsg ;                    /* message to calculate  */
unsigned short usDataLen ;                  /* LRC upon quantity of  */
                                            /* bytes in message      */
{
        unsigned char uchLRC = 0 ;          /* LRC char initialized   */
        while (usDataLen--)                 /* pass through message  */
                uchLRC += *auchMsg++ ;      /* buffer add buffer byte*/
                                            /* without carry         */
        return ((unsigned char)(-((char_uchLRC))) ;
                                            /* return twos complemen */
}
```

9.3 Appendix C: CRC generation

(As taken from the website: www.modicon.com/techpubs/crc7.html)
The Cyclical Redundancy Check (CRC) field is two bytes, containing a 16-bit binary value. The CRC value is calculated by the transmitting device, which appends the CRC to the message. The receiving device recalculates a CRC during receipt of the message, and compares the calculated value to the actual value it received in the CRC field. If the two values are not equal, an error results.
The CRC is started by first preloading a 16-bit register to all 1's. Then a process begins of applying successive eight-bit bytes of the message to the current contents of the register. Only the eight bits of data in each character are used for generating the CRC. Start and stop bits, and the parity bit, do not apply to the CRC.
During generation of the CRC, each eight-bit character is exclusive ORed with the register contents. The result is shifted in the direction of the least significant bit (LSB), with a zero filled into the most significant bit (MSB) position. The LSB is extracted and examined. If the LSB was a 1, the register is then exclusive ORed with a preset, fixed value. If the LSB was a 0, no exclusive OR takes place.
This process is repeated until eight shifts have been performed. After the last (eighth) shift, the next eight-bit character is exclusive ORed with the register's current value, and the process repeats for eight more shifts as described above. The final contents of the register, after all the characters of the message have been applied, is the CRC value.

Generating a CRC
Step 1
Load a 16-bit register with FFFF hex (all 1's). Call this the CRC register.
Step 2
Exclusive OR the first eight-bit byte of the message with the low order byte of the 16-bit CRC register, putting the result in the CRC register.
Step 3
Shift the CRC register one bit to the right (toward the LSB), zerofilling the MSB. Extract and examine the LSB.
Step 4
If the LSB is 0, repeat Step 3 (another shift). If the LSB is 1, Exclusive OR the CRC register with the polynomial value A001 hex (1010 0000 0000 0001).
Step 5
Repeat Steps 3 and 4 until eight shifts have been performed. When this is done, a complete eight-bit byte will have been processed.
Step 6
Repeat Steps 2 ... 5 for the next eight-bit byte of the message. Continue doing this until all bytes have been processed.
Result
The final contents of the CRC register is the CRC value.
Step 7
When the CRC is placed into the message, its upper and lower bytes must be swapped as described below.

Placing the CRC into the Message
When the 16-bit CRC (two eight-bit bytes) is transmitted in the message, the low order byte will be transmitted first, followed by the high order byte-e.g., if the CRC value is 1241 hex (0001 0010 0100 0001):

Addr	Func	Data Count	Data	Data	Data	Data	CRC Lo	CRC Hi
							41	12

Figure 9 CRC Byte Sequence

Example
An example of a C language function performing CRC generation is shown on the following pages. All of the possible CRC values are preloaded into two arrays, which are simply indexed as the function increments through the message buffer. One array contains all of the 256 possible CRC values for the high byte of the 16-bit CRC field, and the other array contains all of the values for the low byte.

Indexing the CRC in this way provides faster execution than would be achieved by calculating a new CRC value with each new character from the message buffer.

Note: This function performs the swapping of the high/low CRC bytes internally. The bytes are already swapped in the CRC value that is returned from the function. Therefore the CRC value returned from the function can be directly placed into the message for transmission.
The function takes two arguments:
unsigned char *puchMsg ; A pointer to the message buffer containing binary data to be used for generating the CRC
unsigned short usDataLen ; The quantity of bytes in the message buffer.
The function returns the CRC as a type unsigned short.

CRC Generation Function

```
unsigned short CRC16(puchMsg, usDataLen)
unsigned char *puchMsg ;                    /* message to calculate CRC upon */
unsigned short usDataLen ;                  /* quantity of bytes in message  */
{
unsigned char uchCRCHi = 0xFF ;             /* high CRC byte initialized */
unsigned char uchCRCLo = 0xFF ;             /* low CRC byte initialized  */
unsigned uIndex ;                           /* will index into CRC lookup table */

        while (usDataLen--)                 /* pass through message buffer */
                {
                uIndex = uchCRCHi ^ *puchMsg++ ;    /* calculate the CRC   */
                uchCRCHi = uchCRCLo ^ auchCRCHi[uIndex] ;
                uchCRCLo = auchCRCLo[uIndex] ;
                }
        return (uchCRCHi << 8 | uchCRCLo) ;
}
```

High Order Byte Table

```
/* Table of CRC values for high-order byte */
static unsigned char auchCRCHi[] = {
0x00, 0xC1, 0x81, 0x40, 0x01, 0xC0, 0x80, 0x41, 0x01, 0xC0,
0x80, 0x41, 0x00, 0xC1, 0x81, 0x40, 0x01, 0xC0, 0x80, 0x41,
0x00, 0xC1, 0x81, 0x40, 0x00, 0xC1, 0x81, 0x40, 0x01, 0xC0,
0x80, 0x41, 0x01, 0xC0, 0x80, 0x41, 0x00, 0xC1, 0x81, 0x40,
0x00, 0xC1, 0x81, 0x40, 0x01, 0xC0, 0x80, 0x41, 0x00, 0xC1,
0x81, 0x40, 0x01, 0xC0, 0x80, 0x41, 0x01, 0xC0, 0x80, 0x41,
0x00, 0xC1, 0x81, 0x40, 0x01, 0xC0, 0x80, 0x41, 0x00, 0xC1,
0x81, 0x40, 0x00, 0xC1, 0x81, 0x40, 0x01, 0xC0, 0x80, 0x41,
0x00, 0xC1, 0x81, 0x40, 0x01, 0xC0, 0x80, 0x41, 0x01, 0xC0,
0x80, 0x41, 0x00, 0xC1, 0x81, 0x40, 0x00, 0xC1, 0x81, 0x40,
0x01, 0xC0, 0x80, 0x41, 0x01, 0xC0, 0x80, 0x41, 0x00, 0xC1,
0x81, 0x40, 0x01, 0xC0, 0x80, 0x41, 0x00, 0xC1, 0x81, 0x40,
0x00, 0xC1, 0x81, 0x40, 0x01, 0xC0, 0x80, 0x41, 0x01, 0xC0,
0x80, 0x41, 0x00, 0xC1, 0x81, 0x40, 0x00, 0xC1, 0x81, 0x40,
0x01, 0xC0, 0x80, 0x41, 0x00, 0xC1, 0x81, 0x40, 0x01, 0xC0,
0x80, 0x41, 0x01, 0xC0, 0x80, 0x41, 0x00, 0xC1, 0x81, 0x40,
0x00, 0xC1, 0x81, 0x40, 0x01, 0xC0, 0x80, 0x41, 0x01, 0xC0,
0x80, 0x41, 0x00, 0xC1, 0x81, 0x40, 0x01, 0xC0, 0x80, 0x41,
0x00, 0xC1, 0x81, 0x40, 0x00, 0xC1, 0x81, 0x40, 0x01, 0xC0,
0x80, 0x41, 0x00, 0xC1, 0x81, 0x40, 0x01, 0xC0, 0x80, 0x41,
0x01, 0xC0, 0x80, 0x41, 0x00, 0xC1, 0x81, 0x40, 0x01, 0xC0,
0x80, 0x41, 0x00, 0xC1, 0x81, 0x40, 0x00, 0xC1, 0x81, 0x40,
0x01, 0xC0, 0x80, 0x41, 0x01, 0xC0, 0x80, 0x41, 0x00, 0xC1,
0x81, 0x40, 0x00, 0xC1, 0x81, 0x40, 0x01, 0xC0, 0x80, 0x41,
0x00, 0xC1, 0x81, 0x40, 0x01, 0xC0, 0x80, 0x41, 0x01, 0xC0,
0x80, 0x41, 0x00, 0xC1, 0x81, 0x40
} ;
```

Low Order Byte Table

```
/* Table of CRC values for low-order byte */
static char auchCRCLo[] = {
0x00, 0xC0, 0xC1, 0x01, 0xC3, 0x03, 0x02, 0xC2, 0xC6, 0x06,
0x07, 0xC7, 0x05, 0xC5, 0xC4, 0x04, 0xCC, 0x0C, 0x0D, 0xCD,
0x0F, 0xCF, 0xCE, 0x0E, 0x0A, 0xCA, 0xCB, 0x0B, 0xC9, 0x09,
0x08, 0xC8, 0xD8, 0x18, 0x19, 0xD9, 0x1B, 0xDB, 0xDA, 0x1A,
0x1E, 0xDE, 0xDF, 0x1F, 0xDD, 0x1D, 0x1C, 0xDC, 0x14, 0xD4,
0xD5, 0x15, 0xD7, 0x17, 0x16, 0xD6, 0xD2, 0x12, 0x13, 0xD3,
0x11, 0xD1, 0xD0, 0x10, 0xF0, 0x30, 0x31, 0xF1, 0x33, 0xF3,
0xF2, 0x32, 0x36, 0xF6, 0xF7, 0x37, 0xF5, 0x35, 0x34, 0xF4,
0x3C, 0xFC, 0xFD, 0x3D, 0xFF, 0x3F, 0x3E, 0xFE, 0xFA, 0x3A,
```

```
0x3B, 0xFB, 0x39, 0xF9, 0xF8, 0x38, 0x28, 0xE8, 0xE9, 0x29,
0xEB, 0x2B, 0x2A, 0xEA, 0xEE, 0x2E, 0x2F, 0xEF, 0x2D, 0xED,
0xEC, 0x2C, 0xE4, 0x24, 0x25, 0xE5, 0x27, 0xE7, 0xE6, 0x26,
0x22, 0xE2, 0xE3, 0x23, 0xE1, 0x21, 0x20, 0xE0, 0xA0, 0x60,
0x61, 0xA1, 0x63, 0xA3, 0xA2, 0x62, 0x66, 0xA6, 0xA7, 0x67,
0xA5, 0x65, 0x64, 0xA4, 0x6C, 0xAC, 0xAD, 0x6D, 0xAF, 0x6F,
0x6E, 0xAE, 0xAA, 0x6A, 0x6B, 0xAB, 0x69, 0xA9, 0xA8, 0x68,
0x78, 0xB8, 0xB9, 0x79, 0xBB, 0x7B, 0x7A, 0xBA, 0xBE, 0x7E,
0x7F, 0xBF, 0x7D, 0xBD, 0xBC, 0x7C, 0xB4, 0x74, 0x75, 0xB5,
0x77, 0xB7, 0xB6, 0x76, 0x72, 0xB2, 0xB3, 0x73, 0xB1, 0x71,
0x70, 0xB0, 0x50, 0x90, 0x91, 0x51, 0x93, 0x53, 0x52, 0x92,
0x96, 0x56, 0x57, 0x97, 0x55, 0x95, 0x94, 0x54, 0x9C, 0x5C,
0x5D, 0x9D, 0x5F, 0x9F, 0x9E, 0x5E, 0x5A, 0x9A, 0x9B, 0x5B,
0x99, 0x59, 0x58, 0x98, 0x88, 0x48, 0x49, 0x89, 0x4B, 0x8B,
0x8A, 0x4A, 0x4E, 0x8E, 0x8F, 0x4F, 0x8D, 0x4D, 0x4C, 0x8C,
0x44, 0x84, 0x85, 0x45, 0x87, 0x47, 0x46, 0x86, 0x82, 0x42,
0x43, 0x83, 0x41, 0x81, 0x80, 0x40
} ;
```

9.4 Appendix D: Coms0300.dat

File example as used by Altosonic-V system

```
-------------------------------------------------------------------------------------------------------------------------------------------
FILE: COMS0300.DAT
-------------------------------------------------------------------------------------------------------------------------------------------
01 [UFC500 COMMUNICATION SETUP]

01.01 UFC_UART_BASEADDRESS    c=#3E8          //COM1=0x3F8, COM2=0x2F8
                                              //COM3=0x3E8, COM4=0x2E8
01.02 UFC_UART_INTERRUPT      c=#4            //3, 4: IRQ3=COM2/4, IRQ4=COM1/3
01.03 UFC_UART_BAUDRATE       c=#28800        //DO NOT CHANGE !
01.04 UFC_UART_RTS_MODE       c=#0            //ENABLE TRANSMITTER WITH LOGICAL 0 OR 1
-------------------------------------------------------------------------------------------------------------------------------------------
02 [PRINTER COMMUNICATION SETUP]

02.01 PRINTER_COMPORT         c=#1            //1, 2, 3, 4
02.02 PRINTER_WORD_LENGTH     c=#7            //7, 8
02.03 PRINTER_PARITY          c=#2            //0=disabled, 1=odd, 2=even
02.04 PRINTER_STOP_BITS       c=#1            //1, 2
02.05 PRINTER_BAUDRATE        c=#9600         //38400, 19200, 9600, 4800, 2400, 1800
                                              //1200, 600, 300, 200, 150, 134.5, 110, 75
02.06 PRINTER_DTR_POLARITY    c=#1            //0=pos, 1=neg
02.07 PRINTER_RTS_POLARITY    c=#1            //0=pos, 1=neg
02.08 PRINTER_TIMEOUT         c=#5000         //Timeout [ms] on acknowledges etc.
02.09 PRINTER_TIMEOUT_MANAGE  c=#30                   //Timeout [ s] for print management switch
-------------------------------------------------------------------------------------------------------------------------------------------
03 [MODBUS COMMUNICATION SETUP]

03.01 MODBUS_UART_BASEADDRESS =#2E8           //COM1=0x3F8, COM2=0x2F8
                                              //COM3=0x3E8, COM4=0x2E8
03.02 MODBUS_UART_INTERRUPT   =#3             //3, 4: (RQ3=COM2/4, IRQ4=COM1/3
03.03 MODBUS_UART_BAUDRATE    =#19200         //1200, 2400, 4800, 9600, 19200
03.04 MODBUS_UART_RTS_MODE    =#0             //0, 1: ENABLE TRANSMITTER LOGICAL 0 OR 1
03.05 MODBUS_UART_N_DATABITS  =#8             //7, 8: NUMBER OF DATABITS
03.06 MODBUS_UART_N_STOPBITS  =#1             //1, 2: NUMBER OF STOPBITS
03.07 MODBUS_UART_PARITY      =#0             //0..2: PARITY 0=NONE, 1=ODD, 2=EVEN
03.08 MODBUS_UART_HALF_DUPLEX=#0              //0, 1: 0=FULL_DUPLEX, 1=HALF DUPLEX
03.09 MODBUS_TRANSFER_MODE    =#1             //0, 1: 0=ASCII, 1=RTU
-------------------------------------------------------------------------------------------------------------------------------------------
04 [SYSTEM CHECK]

04.01 DISPLAY_SYSTEM_INTERR.  =#1             //0, 1: 0=NO, 1=YES
04.02 LOG_RECEIVED_DATA       =#0             //0..10240: 0=NO to 10240 KB
-------------------------------------------------------------------------------------------------------------------------------------------
05 [MODBUS TYPE DEFINITION]

05.01 MODBUS_DEVICE_TYPE      =#1             //1, 2: 1=SLAVE, 2=MASTER
05.02 MODBUS_MODICON_COMPAT   =#0             //0, 1: 0=NOT MODICON COMPATIBLE,
                                              //1=MODICON COMPATIBLE
05.03 MODBUS_SLAVE_ID         =#1             //0.. 247
05.04 FLAG_HOLD_TIME          =#90            //N * 35 ms flag hold time.
05.05 TIME_OUT_ON_READIN      =#10            //TIMEOUT in N seconds for New value input
05.06 TIME_CORRECTION_MODBUS  =#1             //Update system time through modbus
                                              //0=disable, 1=enable
-------------------------------------------------------------------------------------------------------------------------------------------
06 [MODBUS SLAVE ADDRES DEFINITION]

STARTREGISTERS:
06.01 DATAFIELD   1           =#1000          //R boolean
    ACCESS MODE 1             =#0             //0, 1: 0=NORMAL, 1=REVERSED DATATYPE
06.02 DATAFIELD   2           =#2000          //RW boolean
    ACCESS MODE 2             =#0             //0, 1: 0=NORMAL, 1=REVERSED DATATYPE
06.03 DATAFIELD   3           =#3000          //R integer
    ACCESS MODE 3             =#0             //0, 1: 0=NORMAL, 1=REVERSED DATATYPE
06.04 DATAFIELD   4           =#5000          //R long integer
    ACCESS MODE 4             =#0             //0, 1: 0=NORMAL, 1=REVERSED DATATYPE
06.05 DATAFIELD   5           =#7000          //R float
    ACCESS MODE 5             =#0             //0, 1: 0=NORMAL, 1=REVERSED DATATYPE
06.06 DATAFIELD   6           =#6000          //R double
    ACCESS MODE 6             =#0             //0, 1: 0=NORMAL, 1=REVERSED DATATYPE
06.07 DATAFIELD   7           =#7500          //RW float
```

```
    ACCESS MODE 7                =#0              //0, 1: 0=NORMAL, 1=REVERSED DATATYPE
06.08 DATAFIELD   8              =#4000           //RW strings, length=8
    ACCESS MODE 8                =#0              //0, 1: 0=NORMAL, 1=REVERSED DATATYPE
06.09 DATAFIELD   9              =#14000          //RW strings, length=16
    ACCESS MODE 9                =#0              //0, 1: 0=NORMAL, 1=REVERSED DATATYPE
```

---

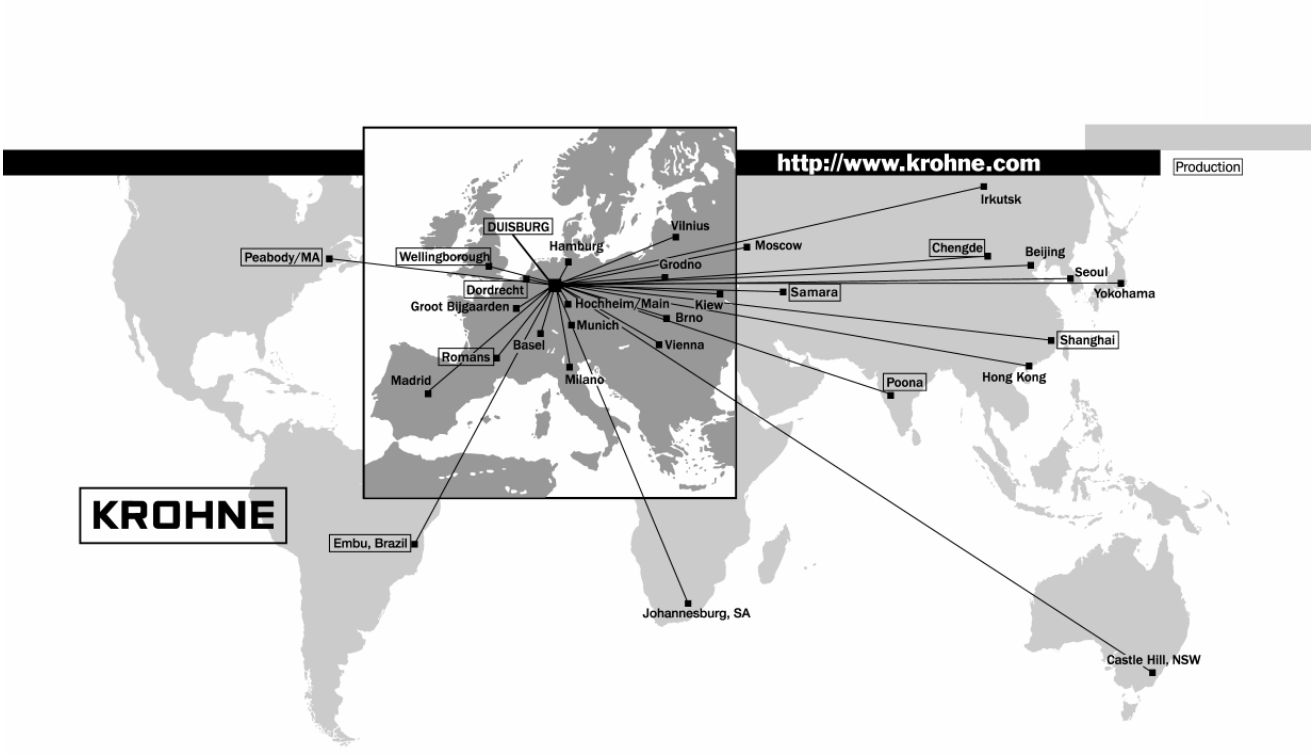
07 [MODBUS MASTER POLLBLOCK DEFINITION]

07.01 NUMBER_OF_POLLBLOCKS_TO_USE =#1 //1..20 NUMBER OF POLLBLOCKS TO TRANSMIT
07.02 REQUEST_TO_RESPONSE_TIMOUT =#10 //35 ms units

POLLBLOCK:
SLAVEID - MODBUS SLAVE ADDRESS, 0..247
MASTERREGISTER - ADDRESS OF DATA IN ALTOSONIC_V, 0..10000
SLAVEREGISTER - ADDRESS OF DATA IN SLAVE, 0..10000
N_POINTS - NUMB OF DATA ITEMS TO TRANSFER
(NOT REGISTERS BUT DATATYPES) 0..255
FUNCTION - FUNCTION TO USE FOR DATA TRANSFER,1..16
DATATYPE - DATATYPE FOR CODING,DECODING AND VERIFICATION
1=boolean
2=integer
3=longinteger
4=float
5=double
DATANOTATION - NORMAL(0) OR REVERSED NOTATION(1) OF THE DATATYPE
DELAY - DELAY TO TRANSMIT NEXT POLLBLOCK 1..30000

07.03

NR	SLAVEID	MASTERREG.	SLAVEREG.	N_POINTS	FUNC	DATATYPE	DATANOT.	DELAY
01	#1	#2000	#7501	#2000	#1	#1	#0	#5
02	#1	#3010	#3501	#10	#3	#2	#0	#5
03	#1	#7010	#7501	#10	#3	#4	#0	#5
04	#1	#5010	#5501	#10	#3	#3	#0	#5
05	#1	#7018	#7501	#2	#3	#4	#0	#5
06	#0	#0	#0	#1	#1	#1	#0	#1
07	#0	#0	#0	#1	#1	#1	#0	#1
08	#0	#0	#0	#1	#1	#1	#0	#1
09	#0	#0	#0	#1	#1	#1	#0	#1
10	#0	#0	#0	#1	#1	#1	#0	#1
11	#0	#0	#0	#1	#1	#1	#0	#1
12	#0	#0	#0	#1	#1	#1	#0	#1
13	#0	#0	#0	#1	#1	#1	#0	#1
14	#0	#0	#0	#1	#1	#1	#0	#1
15	#0	#0	#0	#1	#1	#1	#0	#1
16	#0	#0	#0	#1	#1	#1	#0	#1
17	#0	#0	#0	#1	#1	#1	#0	#1
18	#0	#0	#0	#1	#1	#1	#0	#1
19	#0	#0	#0	#1	#1	#1	#0	#1
20	#0	#0	#0	#1	#1	#1	#0	#1



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