

# M-Bus specification

## Compact heatmeter

**Supercal 739**  
**Superstatic 749**  
**Superstatic 789**



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**Document:** M-Bus Frames 739-749-789  
**Firmware:** 739 V2.0.0

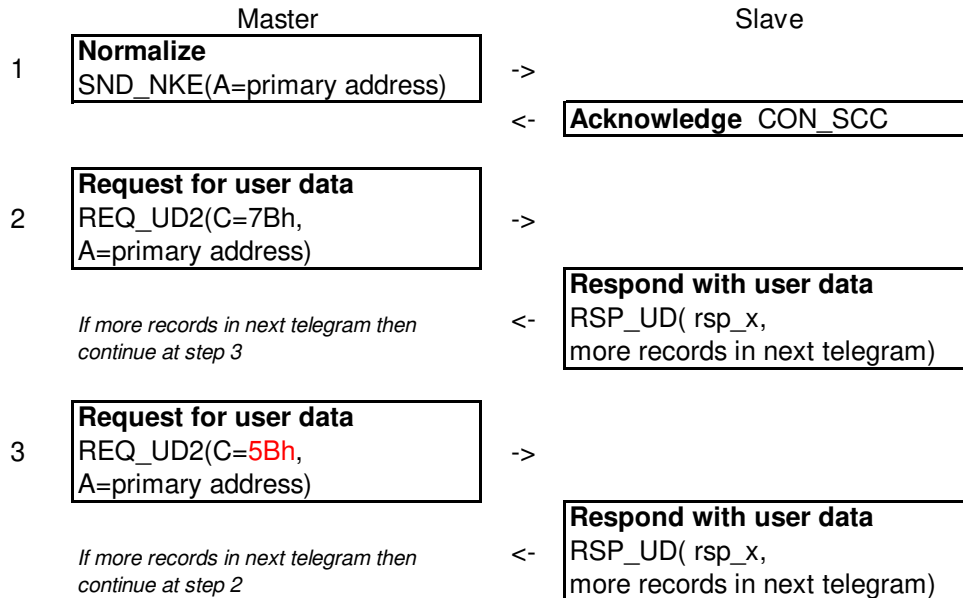
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Technical modifications subject to change without notice

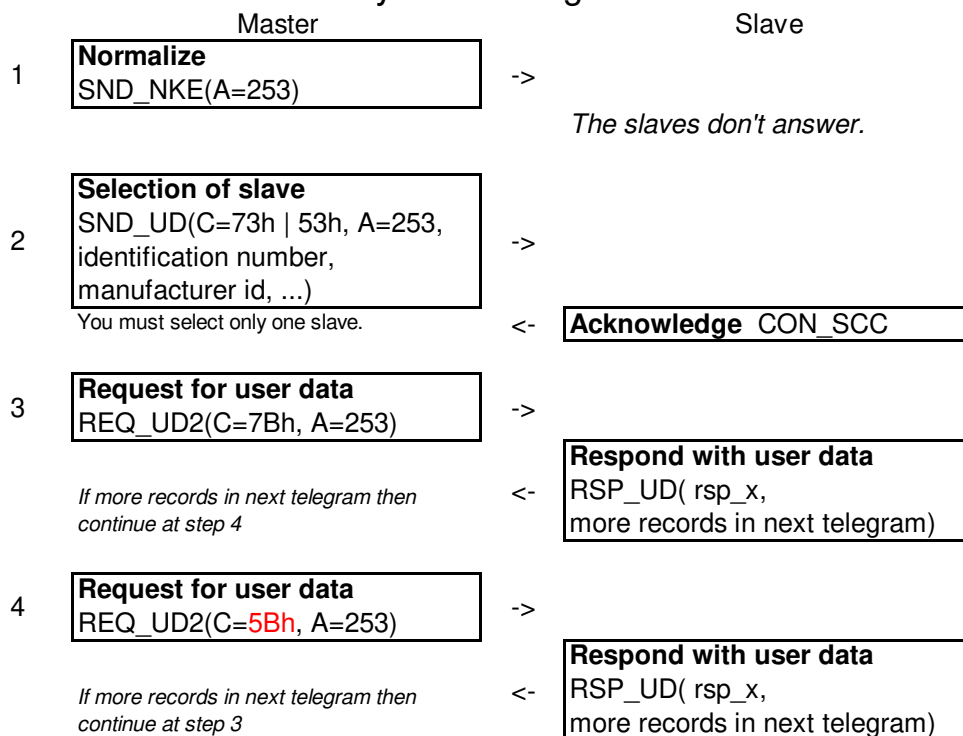
M-Bus Frames 7x9 - V2.0.0\_20190702.xlsx

**Revision:**

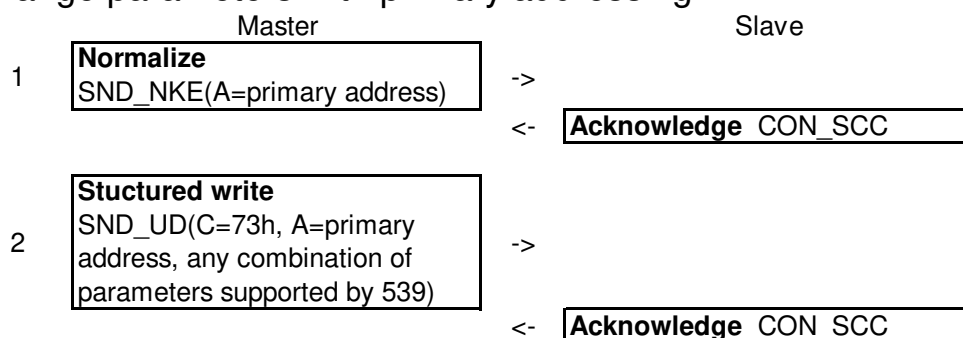
Issue	Date	Author	Description
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### Read data with secondary addressing



### Change parameters with primary addressing



3	<b>Request for user data</b> REQ_UD2(C=7Bh, A=primary address)	->	
	<i>Check for M-Bus application error in Status field.</i>	<-	<b>Respond with user data</b> RSP_UD( rsp_x, more records in next telegram)

### Change parameters with secondary addressing

	Master		Slave
1	<b>Normalize</b> SND_NKE(A=253)	->	
			<i>The slaves don't answer.</i>
2	<b>Selection of slave</b> SND_UD(C=73h   53h, A=253, identification number, manufacturer id, ...)	->	
		<-	<b>Acknowledge CON_SCC</b>
3	<b>Structured write</b> SND_UD(C=73h, A=253, any combination of parameters supported by 539)	->	
		<-	<b>Acknowledge CON_SCC</b>
4	<b>Request for user data</b> REQ_UD2(C=7Bh, A=253)	->	
	<i>Check for M-Bus application error in Status field.</i>	<-	<b>Respond with user data</b> RSP_UD( rsp_x, more records in next telegram)

### Change baudrate with primary addressing

	Master		Slave
1	<b>Normalize</b> SND_NKE(A=primary address)	->	
		<-	<b>Acknowledge CON_SCC</b>
2	<b>Set baurate</b> SND_UD(C=73h, A=primary address, CI=B8h   BBh)	->	
	<i>From here, you can use the new baudrate</i>	<-	<b>Acknowledge CON_SCC</b>
3	<b>Request for user data</b> REQ_UD2(C=7Bh, A=primary address)	->	
	<i>Check for M-Bus application error in Status field.  If you don't have a response,  repeat step 3 with the old  baudrate.</i>	<-	<b>Respond with user data</b> RSP_UD( rsp_x, more records in next telegram)

Keys

Optional record  
All value of keys are in hexadecimal

xx Value LSByte first  
yy Value MSByte first

ar Device access rights

00	Consumer
01	Installer
02	Verifier
03	Manufacturer

bd bd Wire M-Bus baudrate

2C 01	300 Bauds
60 09	2400 Bauds

ce Complementary counter enabled

00	disabled
01	enabled

cf cf Complementary counter pulse factor

93	0.001 m3/pulse
94	0.01 m3/pulse
95	0.1 m3/pulse
96	1 m3/pulse
FD BA	unit/pulse

co co Physical unit coding of complementary counter :

13	0.001 m3
14	0.01 m3
15	0.1 m3
16	1 m3
FD 3A	1 without unit

Volume
Dimensionless

cs The value of Check Sum is calculated from arithmetical sum modulo 256 of each byte of the frame except the fields:  
Start, Length (if any), Check Sum and Stop.

ct Communication module type

00	None
01	M-Bus
02	MFD
03	OMS
04	LoRaWAN

cu	Complementary counter unit	
	00	0.001 m3
	01	0.01 m3
	02	0.1 m3
	03	1 m3
	04	1 without unit
dt	04	Heat
	0C	Heat (Volume measured at flow temperature: inlet)
	0D	Heat / Cooling load meter
	0A	Cooling (Volume measured at flow temperature: outlet)
	0B	Cooling (Volume measured at return temperature: inlet)
ee	Energy tariff 1	
	00	None
	01	Cooling
en	Physical unit coding of energy :	
	05	0.1 kWh
	06	1 kWh
	07	0.01 MWh
	0E	1 MJ
	0F	0.01 GJ
em	Encryption method	
	00	None
	01	AES mode 5
	02	AES mode 7
er er	Detailed errors <b>7x9</b>	
	bit0	ref1 error AD
	bit1	sensor1 error AD
	bit2	ref2 error AD
	bit3	sensor2 error AD
	bit4	AD timeout error
	bit5	temperature 1 out of range
	bit6	temperature 2 out of range
	bit7	flow in saturation
	bit8	Application error unknow field C
	bit9	Application error unknow field CI
	bit10	Application error unknow record
	bit11	Application error access right
	bit12	Application error record size
	bit13	Application error record value
	bit14	†
	bit15	Device disabled

Not yet implemented

**M-Bus standard**

† Not used.

et	Energy meter type	
	00	Heat
	01	Heat / Cooling
	02	Cooling
eu	Energy unit	
	00	0.1 kWh
	01	1 kWh
	02	0.001 MWh
	03	0.01 MWh
	04	0.001 GJ
	05	0.01 GJ
fp	Flow meter position	
	00	in cold pipe
	01	in hot pipe
fm	Flow meter model	
	00	qp 0.6, 3/4", 110mm
	01	qp 1.0, 3/4", 110mm
	02	qp 1.5, 3/4", 110mm
	03	qp 1.5, 1", 130mm
	04	qp 2.5, 1", 130mm
	05	qp 0.6, G2"
	06	qp 1.5, G2"
	07	qp 2.5, G2"
	08	qp 0.6, M77
	09	qp 1.5, M77
	0A	qp 2.5, M77
	0B	749 qp 0.6, 3/4", 110mm
	0C	749 qp 1.5, 3/4", 110mm
	0D	749 qp 1.5, 1", 130mm
	0E	749 qp 1.5, 1", 190mm
	0F	749 qp 2.5, 1", 130mm
	10	749 qp 2.5, 1", 190mm
	11	789 qp 0.6, 3/4", 110mm
	12	789 qp 1.5, 3/4", 110mm
	13	789 qp 1.5, 1", 130mm
	14	789 qp 1.5, 1", 190mm
	15	789 qp 2.5, 1", 130mm
	16	789 qp 2.5, 1", 190mm
hh hh hh	Radio activity calendar (hours)	
	bit0	0h00..0h59
	bit1	1h00..1h59
	bit2	2h00..2h59
	bit3	3h00..3h59
	bit4	4h00..4h59
	bit5	5h00..5h59
	bit6	6h00..6h59
	bit7	7h00..7h59
	bit8	8h00..8h59
	bit9	9h00..9h59
	bit10	10h00..10h59
	bit11	11h00..11h59
	bit12	12h00..12h59
	bit13	13h00..13h59
	bit14	14h00..14h59
	bit15	15h00..15h59
	bit16	16h00..16h59
	bit17	17h00..17h59
	bit18	18h00..18h59
	bit19	19h00..19h59
	bit20	20h00..20h59
	bit21	21h00..21h59
	bit22	22h00..22h59
	bit23	23h00..23h59

Le Length of the M-Bus frame. The fields Start, Length, Check Sum and Stop (6 bytes) are not included in the calculation of the Length field. The Length field is repeated twice preceded and followed by the Start field 68h.

Lp	Lp	LoRaWAN Parameter activation	
	bit1..0	LoRaWAN Confirm mode:	
	00b	Disabled	
	01b	Enabled for each transmission	
	10b	One time per day (at midnight)	Not yet implemented
	11b	†	
	bit2	"0" = Activation OTAA "1" = Activation ABP (not implemented)	
	bit3	"0" = LoRaWAN Public network "1" = LoRaWAN Private network	
	bit4	"0" = No RTC synchronisation "1" = Automatic RTC synchronisation with LoRaWAN system time	Doesn't work with every LoRaWAN provider!
	bit6..5	Sending interval limitation when spreading factor high (SF11 &12)	
	00b	No limitation	
	01b	Skip 1 telegram --> Send a telegram every 2x sending interval	
	10b	Skip 2 telegrams --> Send a telegram every 3x sending interval	
	11b	Skip 3 telegrams --> Send a telegram every 4x sending interval	
	bit7	†	
	bit8	†	
	bit9	†	
	bit10	†	
	bit11	†	
	bit12	†	
	bit13	†	
	bit14	†	
	bit15	†	
mm	mm	Radio activity calendar (month's year)	
	bit0	†	
	bit1	January	
	bit2	February	
	bit3	March	
	bit4	April	
	bit5	May	
	bit6	June	
	bit7	July	
	bit8	August	
	bit9	September	
	bit10	October	
	bit11	November	
	bit12	December	
	bit13	†	
	bit14	†	
	bit15	†	



mo	More records in next telegram :	
	0F	no
	1F	yes
o1 o2 o3	Output totalizers sources	
	Array of 3 bytes o1 o2 o3, the byte o1 is the output 1, the byte o2 is the output 2, the byte o3 is the output 3, each output has a source :	
	00 : None	
	01: Volume	
	02: Energy	
	03: Energy cooling	
ob	Output burst totalizers sources	
	bit0	"0" = TOT1 delta test energies disable "1" = TOT1 delta test energies enable
	bit1	"0" = TOT2 volume disable "1" = TOT2 volume enable
pm	Radio activity calendar (part of month)	
	bit0	From 1st to 4th of month
	bit1	From 5th to 8th of month
	bit2	From 9th to 12th of month
	bit3	From 13th to 16th of month
	bit4	From 17th to 20th of month
	bit5	From 21th to 24th of month
	bit6	From 25th to 28th of month
	bit7	From 29th to end of month
pp	Parameter activation	
	bit0	"0" = Sending radio disable "1" = Sending radio enable
		Only LoRa and wM-Bus
	bit1	"0" = Encryption AES disable "1" = Encryption AES enable
		Only wM-Bus and STX Radio
	bit2	"0" = OMS frame "1" = Walk-by frame(s)
	bit3	"0" = Instantaneous values in floating "1" = Instantaneous values in integer
	bit5..4	Operating mode
	00b	Normal
	01b	Storage <b>(only with device unsealed)</b>
	10b	Storage + configurable <b>(only with device unsealed)</b>
	11b	<i>Not used</i>
	bit6	"0" = Menu LCD High resolution disable "1" = Menu LCD High resolution enable
	bit7	Reserved
rr	Radio communication mode	Not yet implemented
	00	Mode C1
	01	Mode T1

st	Status	<b>7x9</b>	<b><i>M-Bus standard</i></b>
	bit1..0	Application	<i>Application</i>
	00b	No error	<i>No error</i>
	01b	†	<i>Application busy</i>
	10b	Any application error	<i>Any application error</i>
	11b	†	<i>Reserved</i>
	bit2	†	<i>Power low</i>
	bit3	Permanent error	<i>Permanent error</i>
	bit4	Temporary error	<i>Temporary error</i>
	bit5	Flow error	<i>Manufacturer specific</i>
	bit6	Temperature error	<i>Manufacturer specific</i>
	bit7	LoRaWAN not joined	<i>Manufacturer specific</i>
vo	Physical unit coding of volume :		
	13	0.001 m3	
	14	0.01 m3	
vu	Volume unit		
	00	0.001 m3	Not allowed with qp 2.5
	01	0.01 m3	
ww	Radio activity calendar (days of the week)		
	bit0	†	
	bit1	Monday	ISO8601
	bit2	Tuesday	
	bit3	Wednesday	
	bit4	Thursday	
	bit5	Friday	
	bit6	Saturday	
	bit7	Sunday	

**Normalize** SND\_NKE (master to slave)

	Field	Frame bytes in hex	Coding	Comment
Start	Start	10		
	Control	40		Normalize, SND_NKE
	Address	xx		
End	Check Sum	3D		
	Stop	16		

Frame size: 5 bytes

**Acknowledge** CON\_SCC (slave to master)

	Field	Frame bytes in hex	Coding	Comment
		E5		Acknowledge

Frame size: 1 bytes

**Application reset** SND\_UD (master to slave)

	Field	Frame bytes in hex (Note 1)	Coding	Comment
Start	Start_Length	68, Le Le, 68		
	Control	73   53		Send user data to slave, SND_UD
	Address	xx		
User data	Control Information	50		Application reset
	Subcode	xx	C, 8 bits	Empty, 00h, 01h : rsp_1_rsp_6 80h : rsp_conf_1..rsp_conf_4 91h : rsp_verif (Start Nowa Test) 92h : rsp_verif (Stop Nowa Test) 93h : rsp_verif (Simulate volume) <b>after sending this command, please wait 5sec before readout the result frame.</b>
End	Check Sum	C8		
	Stop	16		

Max frame size: 10 bytes

**Request for user data** REQ\_UD2 (master to slave)

	Field	Frame bytes in hex	Coding	Comment
Start	Start	10		
	Control	7B   5B		Request for class 2 data, REQ_UD2
	Address	xx		
End	Check Sum	C8		
	Stop	16		

Frame size: 5 bytes

**Set baudrate** SND\_UD (master to slave)

	Field	Frame bytes in hex	Coding	Comment
Start	Start_Length	68, 03 03, 68		
	Control	73   53		Send user data to slave, SND_UD
	Address	xx		
User Data	Control Information	B8   BB		Set baud rate: B8h: 300; BBh: 2400bit/s
End	Check Sum	C8		
	Stop	16		

Frame size: 9 bytes

**Selection of slaves** SND\_UD (master to slave)

					<MbusRecord> XML attributes				
	Field	Frame bytes in hex (Note 1)	Coding	Comment	Name	SubUnit	Tarif	Storage	Parent tag
Start	Start_Length	68, Le Le, 68							
	Control	73   53		Send user data to slave, SND_UD					
	Address	FD							
User data	Control Information	52		Selection of slaves					
	Identification number	xx xx xx xx	A, 32 bits		IdentificationNumber				<Header>
	Manufacturer ID	xx xx	C, 16 bits		Manufacturer				
	Generation of meter	xx	C, 8 bits		Version				
	Measured media	xx	D, 8 bits		DeviceType				
End	Check Sum	C8							
	Stop	16							

Max frame size: 17 bytes

**Symbols**

‡ Function: 0=instantaneous, 1=maximum, 2=minimum, 3=during error state

**Notes**

1. For non hexadecimal or lower case digits see the detailed description in the Keys sheet.

## Structured write SND\_UD (master to slave)

					<MbusRecord> XML attributes					
	Field	Frame bytes in hex (Note 1)	Coding	Comment	Name	SubUnit	Tariff	Storage	Function	Parent tag
Start	Start Length	68, 1e, 1e, 68								
	Control	73, 53		Send user data to slave, SND_UD						
	Address	xx								
	Control Information	51		Structured write telegram						
User data	Current date & time	04, 6D, xx, xx, xx, xx	F, 32 bits		DateAndTime	0	0	0	0	
	Enter the installer password	0C, FD, 13, xx, xx, xx, xx	A, 32 bits		AccessCodeOperator	0	0	0	0	
	Change the installer password	4C, FD, 13, xx, xx, xx, xx	A, 32 bits	Note 2	AccessCodeOperator	0	0	1	0	
	Wire M-Bus primary address	01, 7A, xx	C, 8 bits	Note 2	PrimaryAddress	0	0	0	0	
	Wire M-Bus baudrate	02, FD, 1C, bd, bd	C, 16 bits	Note 2	BaudRate	0	0	0	0	
	Identification number	0C, 79, xx, xx, xx, xx	A, 32 bits	Note 2	IdentificationNumber	0	0	0	0	
	Battery use duration	03, 22, xx, xx, xx, xx	B, 24 bits	[h] Note 2	OnTime	0	0	0	0	
	Set day	82, 0A, 6C, xx, xx	G, 16 bits	Note 2	Date	0	0	20	0	
	Complementary counter 1 identification	8C, 40, 79, xx, xx, xx, xx	A, 32 bits	Note 2	IdentificationNumber	1	0	0	0	
	Complementary counter 1 totalizer	84, 40, c0, xx, xx, xx, xx	B, 32 bits	Note 2	Dimensionless   Volume	1	0	0	0	
	Complementary counter 1 remainder	85, 40, FF, 02, xx, xx, xx, xx	H, 32 bits	Note 2	VolumeRemainder	1	0	0	0	
	Complementary counter 1 totalizer at set day	84, 4A, c0, c0, xx, xx, xx, xx	B, 32 bits	Note 2	Dimensionless   Volume	1	0	20	0	
	Complementary counter 1 unit	81, 40, FF, FF, 05, cu	C, 8 bits	\$ Note 2	AuxiliaryInputUnit	1	0	0	0	
	Complementary counter 1 pulse factor	85, 40, cf, cf, 28, xx, xx, xx, xx	H, 32 bits	Note 2	Dimensionless_PerInputPulseOnChannel0   Volume_PerInputPulseOnChannel0	1	0	0	0	
	Initialize all monthly values of complementary counter 1	C4, 49, c0, c0, xx, xx, xx, xx	B, 32 bits	Note 2	Dimensionless   Volume	1	0	19	0	
	Complementary counter 2 identification	8C, 80, 40, 79, xx, xx, xx, xx	A, 32 bits	Note 2	IdentificationNumber	2	0	0	0	
	Complementary counter 2 totalizer	84, 80, 40, c0, c0, xx, xx, xx, xx	B, 32 bits	Note 2	Dimensionless   Volume	2	0	0	0	
	Complementary counter 2 remainder	85, 80, 40, FF, 02, xx, xx, xx, xx	H, 32 bits	Note 2	VolumeRemainder	2	0	0	0	
	Complementary counter 2 totalizer at set day	84, 8A, 40, c0, c0, xx, xx, xx, xx	B, 32 bits	Note 2	Dimensionless   Volume	2	0	20	0	
	Complementary counter 2 unit	81, 80, 40, FF, FF, 05, cu	C, 8 bits	\$ Note 2	AuxiliaryInputUnit	2	0	0	0	
	Complementary counter 2 pulse factor	85, 80, 40, cf, cf, 28, xx, xx, xx, xx	H, 32 bits	Note 2	Dimensionless_PerInputPulseOnChannel0   Volume_PerInputPulseOnChannel0	2	0	0	0	
	Initialize all monthly values of complementary counter 2	C4, 89, 40, c0, c0, xx, xx, xx, xx	B, 32 bits	Note 2	Dimensionless   Volume	2	0	19	0	
	Change the AES128 encryption key (LoRaWAN NwkKey)	0D, FD, 19, F0, xx, xx, xx, xx, xx, xx, xx, xx, xx, xx, xx, xx	LVAR, 128 bits	Note 2	SecurityKey	0	0	0	0	
	LoRaWAN AppKey	8D, 40, FD, 19, F0, xx, xx, xx, xx, xx, xx, xx, xx, xx, xx, xx	LVAR, 128 bits	Note 2	SecurityKey	1	0	0	0	
	State of parameter	01, FD, 66, pp	D, 8 bits	Note 2, after we are in "CONSUMER"	StateOfParameterActivation	0	0	0	0	
	LoRaWAN State of parameters	02, FF, 48, 1p, 1p	D, 16 bits	\$ Note 2	DeviceSpecificValue8	0	0	0	0	
	Delay used when delayed join	01, FF, 13, xx	C, 8 bits	[min] \$ Note 2	Timeout	0	0	0	0	
	RF transmission interval	02, FD, 3D, xx, xx	C, 16 bits	[min] Note 2	PeriodOfNominalDataTransmissions	0	0	0	0	
	Start LoRaWAN join process	01, FF, 24, CC	C, 8 bits	\$ Note 2	StartProcess	0	0	0	0	
	Force sending LoRaWAN telegram	01, FF, 24, AE	C, 8 bits	\$ Note 2	StartProcess	0	0	0	0	
	LoRaWAN JoinEUI	0D, FF, FF, 25, 08, xx, xx, xx, xx, xx, xx, xx, xx, xx, xx, xx	LVAR	\$ Note 2	LoraJoinEUI	0	0	0	0	
	Radio activity calendar	8D, 20, FD, 76, E7, hh, hh, hh, ww, mm, mm, pm	LVAR	Note 2	DataContainerForManufacturerProtocol	0	2	0	0	
	LoRaWAN FPort frame selection	01, FF, FF, 26, xx	C, 8 bits	\$ Note 2	LoraFPort	0	0	0	0	
	Time Zone	01, FF, 1F, xx	B, 8 bits	\$, xx*15 min; xx=4 means UTC+01:00 Note 2	TimeZone	0	0	0	0	
	Encryption method	01, FF, FF, 39, em	C, 8 bits	\$ Note 2	EncryptionEnabled	0	0	0	0	
	Radio communication mode	01, FF, FF, 3A, rr	C, 8 bits	\$ Note 2	RadioCommunicationMode	0	0	0	0	
End	Check Sum	cs								
	Stop	16								

Max frame size: 165 bytes

## Symbols

‡ Function: 0=instantaneous, 1=maximum, 2=minimum, 3=during error state  
\$ manufacturer specific VIFE

## Notes

- For non hexadecimal or lower case digits see the detailed description in the Keys sheet.
- The installer access right (or higher) is needed to change this value
- The verifier access right (or higher) is needed to change this value

**Respond with user data** RSP\_UD, Variable structure response (slave to master)

	Field	Frame bytes in hex (Note 1)	Bytes	Coding	Comment	<MbusRecord> XML attributes					
						Name (Note 2)	SubUnit	Tarif	Storage	Function†	Parent tag
Start	Start Length	68, Le Le, 68	4								
	Control	08	1		Respond with user data, RSP_UD						
	Address	xx	1								
User data	Control Information	72	1		Variable structure respond						
	Identification number	xx xx xx xx	4	A, 32 bits		IdentificationNumber					<Header>
	Manufacturer ID	EE 4D	2	C, 16 bits	"SON"	Manufacturer					
	Version of meter	1B	1	C, 8 bits	27	Version					
	Device type	dt	1	D, 8 bits		DeviceType					
	Access number	xx	1	C, 8 bits		AccessNumber					
	Status	st	1	Ds, 8 bits		Status					
	Configuration	00 00	2	C, 16 bits		Configuration					
	Energy totalizer heating	04, en, xx xx xx xx	6	B, 32 bits		Energy	0	0	0	0	<Records>
	Energy totalizer heating at set day	84 0A, en, xx xx xx xx	7	B, 32 bits		Energy	0	0	20	0	
	Volume totalizer	04, vo, xx xx xx xx	6	B, 32 bits		Volume	0	0	0	0	
	Volume totalizer at set day	84 0A, vo, xx xx xx xx	7	B, 32 bits		Volume	0	0	20	0	
	Internal version	0B, FD 0F, xx xx xx	6	A, 24 bits		OtherSoftwareVersion	0	0	0	0	
	Hardware version	0A, FD 0D, xx xx	5	A, 16 bits		HardwareVersion	0	0	0	0	
	Energy totalizer cooling	84 10, en, xx xx xx xx	7	B, 32 bits		Energy	0	1	0	0	
	Energy totalizer cooling at set day	84 1A, en, xx xx xx xx	7	B, 32 bits		Energy	0	1	20	0	
	Temperature inlet maximum for cooling	95 10, 5B, xx xx xx xx	7	H, 32 bits	[°C]	FlowTemperature	0	1	0	1	
	Complementary counter 1 Identification	8C 40, 79, xx xx xx xx	7	A, 32 bits		IdentificationNumber	1	0	0	0	
	Complementary counter 1 totalizer	84 40, co co, xx xx xx xx	8	B, 32 bits		Dimensionless   Volume	1	0	0	0	
	Complementary counter 1 totalizer at set day	84 4A, co co, xx xx xx xx	8	B, 32 bits		Dimensionless   Volume	1	0	20	0	
	Complementary counter 2 Identification	8C 80 40, 79, xx xx xx xx	8	A, 32 bits		IdentificationNumber	2	0	0	0	
	Complementary counter 2 totalizer	84 80 40, co co, xx xx xx xx	9	B, 32 bits		Dimensionless   Volume	2	0	0	0	
	Complementary counter 2 totalizer at set day	84 8A 40, co co, xx xx xx xx	9	B, 32 bits		Dimensionless   Volume	2	0	20	0	
	Energy remainder heating	05, FF 01, xx xx xx xx	7	H, 32 bits	\$	EnergyRemainder	0	0	0	0	
	Volume remainder	05, FF 02, xx xx xx xx	7	H, 32 bits	\$	VolumeRemainder	0	0	0	0	
	Energy remainder cooling	85 10, FF 01, xx xx xx xx	8	H, 32 bits	\$	EnergyRemainder	0	1	0	0	
	DevEUI	0D, FF FF 24, 08, xx xx xx xx xx	13	LVAR	\$	LoraDevEUI	0	0	0	0	
	Fabrication Number	0C, 78, xx xx xx xx	6	A, 32 bits		FabricationNumber	0	0	0	0	
	Current date & time	04, 6D, xx xx xx xx	6	F, 32 bits		DateAndTime	0	0	0	0	
	Set day	82 0A, 6C, xx xx	5	G, 16 bits		Date	0	0	20	0	
	High temperature	05, 5B, xx xx xx xx	6	H, 32 bits	[°C]	FlowTemperature	0	0	0	0	
	Low temperature	05, 5F, xx xx xx xx	6	H, 32 bits	[°C]	ReturnTemperature	0	0	0	0	
	Flow	05, 3E, xx xx xx xx	6	H, 32 bits	[m3/h]	VolumeFlow	0	0	0	0	
	Power	05, 2B, xx xx xx xx	6	H, 32 bits	[W]	Power	0	0	0	0	
	Device access right	01, FF 2B, ar	4	D, 8 bits	\$	DeviceAccessRightLevel	0	0	0	0	
	Battery use duration	03, 22, xx xx xx	5	B, 24 bits	[h]	OnTime	0	0	0	0	
	Detailed errors	02, FF 2C, er er	5	D, 16 bits	\$	ManufacturerErrorFlags	0	0	0	0	
	More records in next telegram	mo	1		Start of manufacturer specific data	ManufacturerDataBlock					
End	Check Sum	cs	1								
	Stop	16	1								

Max frame size: 219 bytes

**Symbols**

‡ Function: 0=instantaneous, 1=maximum, 2=minimum, 3=during error state

\$ manufacturer specific VIFE

**Notes**

1. For non hexadecimal or lower case digits see the detailed description in the Keys sheet.

2. Depending on the device configuration the kind of some values can be different. Therefore the XML attribute name can be one of the name separated by "|".

**Respond with user data** RSP\_UD, Variable structure response (slave to master)

	Field	Frame bytes in hex (Note 1)	Bytes	Coding	Comment	<MbusRecord> XML attributes					
						Name (Note 2)	SubUnit	Tarif	Storage	Function†	Parent tag
Start	Start Length	68, Le, Le, 68	4								
	Control	08	1		Respond with user data, RSP_UD						
	Address	xx	1								
User data	Control Information	72	1		Variable structure respond						
	Identification number	xx xx xx xx	4	A, 32 bits		IdentificationNumber					<Header>
	Manufacturer ID	EE 4D	2	C, 16 bits	"SON"	Manufacturer					
	Version of meter	1B	1	C, 8 bits	27	Version					
	Device type	dt	1	D, 8 bits		DeviceType					
	Access number	xx	1	C, 8 bits		AccessNumber					
	Status	st	1	Ds, 8 bits		Status					
	Configuration	00 00	2	C, 16 bits		Configuration					
	Energy totalizer heating	04, en, xx xx xx xx	6	B, 32 bits		Energy	0	0	0	0	<Records>
	Energy totalizer heating at set day	84 0A, en, xx xx xx xx	7	B, 32 bits		Energy	0	0	20	0	
	Volume totalizer	04, vo, xx xx xx xx	6	B, 32 bits		Volume	0	0	0	0	
	Volume totalizer at set day	84 0A, vo, xx xx xx xx	7	B, 32 bits		Volume	0	0	20	0	
	Internal version	0B, FD 0F, xx xx xx	6	A, 24 bits		OtherSoftwareVersion	0	0	0	0	
	Hardware version	0A, FD 0D, xx xx	5	A, 16 bits		HardwareVersion	0	0	0	0	
	Energy totalizer cooling	84 10, en, xx xx xx xx	7	B, 32 bits		Energy	0	1	0	0	
	Energy totalizer cooling at set day	84 1A, en, xx xx xx xx	7	B, 32 bits		Energy	0	1	20	0	
	Temperature inlet maximum for cooling	95 10, 5B, xx xx xx xx	7	H, 32 bits	[°C]	FlowTemperature	0	1	0	1	
	Complementary counter 1 Identification	8C 40, 79, xx xx xx xx	7	A, 32 bits		IdentificationNumber	1	0	0	0	
	Complementary counter 1 totalizer	84 40, co co, xx xx xx xx	8	B, 32 bits		Dimensionless   Volume	1	0	0	0	
	Complementary counter 1 totalizer at set day	84 4A, co co, xx xx xx xx	8	B, 32 bits		Dimensionless   Volume	1	0	20	0	
	Complementary counter 2 Identification	8C 80 40, 79, xx xx xx xx	8	A, 32 bits		IdentificationNumber	2	0	0	0	
	Complementary counter 2 totalizer	84 80 40, co co, xx xx xx xx	9	B, 32 bits		Dimensionless   Volume	2	0	0	0	
	Complementary counter 2 totalizer at set day	84 8A 40, co co, xx xx xx xx	9	B, 32 bits		Dimensionless   Volume	2	0	20	0	
	Energy remainder heating	05, FF 01, xx xx xx xx	7	H, 32 bits	\$	EnergyRemainder	0	0	0	0	
	Volume remainder	05, FF 02, xx xx xx xx	7	H, 32 bits	\$	VolumeRemainder	0	0	0	0	
	Energy remainder cooling	85 10, FF 01, xx xx xx xx	8	H, 32 bits	\$	EnergyRemainder	0	1	0	0	
	DevEUI	0D, FF FF 24, 08, xx xx xx xx xx	13	LVAR	\$	LoraDevEUI	0	0	0	0	
	Fabrication Number	0C, 78, xx xx xx xx	6	A, 32 bits		FabricationNumber	0	0	0	0	
	Current date & time	04, 6D, xx xx xx xx	6	F, 32 bits		DateAndTime	0	0	0	0	
	Set day	82 0A, 6C, xx xx	5	G, 16 bits		Date	0	0	20	0	
	High temperature	02, 59, xx xx	4	B, 16 bits	[0.01°C]	FlowTemperature	0	0	0	0	
	Low temperature	02, 5D, xx xx	4	B, 16 bits	[0.01°C]	ReturnTemperature	0	0	0	0	
	Flow	02, 3B, xx xx	4	B, 16 bits	[0.001 m3/h]	VolumeFlow	0	0	0	0	
	Power	03, 2C, xx xx xx	5	B, 24 bits	[0.01 kW]	Power	0	0	0	0	
	Device access right	01, FF 2B, ar	4	D, 8 bits	\$	DeviceAccessRightLevel	0	0	0	0	
	Battery use duration	03, 22, xx xx xx	5	B, 24 bits	[h]	OnTime	0	0	0	0	
	Detailed errors	02, FF 2C, er er	5	D, 16 bits	\$	ManufacturerErrorFlags	0	0	0	0	
	More records in next telegram	mo	1		Start of manufacturer specific data	ManufacturerDataBlock					
End	Check Sum	cs	1								
	Stop	16	1								

Max frame size: 212 bytes

**Symbols**

‡ Function: 0=instantaneous, 1=maximum, 2=minimum, 3=during error state

\$ manufacturer specific VIFE

**Notes**

1. For non hexadecimal or lower case digits see the detailed description in the Keys sheet.

2. Depending on the device configuration the kind of some values can be different. Therefore the XML attribute name can be one of the name separated by "|".

**Respond with user data** RSP\_UD, Variable structure response (slave to master)

						<MbusRecord> XML attributes					
						Name	SubUnit	Tariff	Storage	Function†	Parent tag
Start	Field	Frame bytes in hex (Note 1)	Bytes	Coding	Comment						
	Start, Length	68, Le Le, 68	4								
	Control	08	1		Respond with user data, RSP_UD						
	Address	xx	1								
User data	Control Information	72	1		Variable structure respond						
	Identification number	xx xx xx xx	4	A, 32 bits		IdentificationNumber					<Header>
	Manufacturer ID	EE 4D	2	C, 16 bits	"SON"	Manufacturer					
	Version of meter	1B	1	C, 8 bits	27	Version					
	Device type	dt	1	D, 8 bits		DeviceType					
	Access number	xx	1	C, 8 bits		AccessNumber					
	Status	st	1	Ds, 8 bits		Status					
	Configuration	00 00	2	C, 16 bits		Configuration					
	Energy stored at month - 1	44,en,xx xx xx xx	6	B, 32 bits		Energy	0	0	1	0	<Records>
	Energy stored at month - 2	84 01,en,xx xx xx xx	7	B, 32 bits		Energy	0	0	2	0	
	Energy stored at month - 3	C4 01,en,xx xx xx xx	7	B, 32 bits		Energy	0	0	3	0	
	Energy stored at month - 4	84 02,en,xx xx xx xx	7	B, 32 bits		Energy	0	0	4	0	
	Energy stored at month - 5	C4 02,en,xx xx xx xx	7	B, 32 bits		Energy	0	0	5	0	
	Energy stored at month - 6	84 03,en,xx xx xx xx	7	B, 32 bits		Energy	0	0	6	0	
	Energy stored at month - 7	C4 03,en,xx xx xx xx	7	B, 32 bits		Energy	0	0	7	0	
	Energy stored at month - 8	84 04,en,xx xx xx xx	7	B, 32 bits		Energy	0	0	8	0	
	Energy stored at month - 9	C4 04,en,xx xx xx xx	7	B, 32 bits		Energy	0	0	9	0	
	Energy stored at month - 10	84 05,en,xx xx xx xx	7	B, 32 bits		Energy	0	0	10	0	
	Energy stored at month - 11	C4 05,en,xx xx xx xx	7	B, 32 bits		Energy	0	0	11	0	
	Energy stored at month - 12	84 06,en,xx xx xx xx	7	B, 32 bits		Energy	0	0	12	0	
	Energy stored at month - 13	C4 06,en,xx xx xx xx	7	B, 32 bits		Energy	0	0	13	0	
	Energy stored at month - 14	84 07,en,xx xx xx xx	7	B, 32 bits		Energy	0	0	14	0	
	Energy stored at month - 15	C4 07,en,xx xx xx xx	7	B, 32 bits		Energy	0	0	15	0	
	Energy stored at month - 16	84 08,en,xx xx xx xx	7	B, 32 bits		Energy	0	0	16	0	
	Energy stored at month - 17	C4 08,en,xx xx xx xx	7	B, 32 bits		Energy	0	0	17	0	
	Energy stored at month - 18	84 09,en,xx xx xx xx	7	B, 32 bits		Energy	0	0	18	0	
	Complementary counter 1 pulse factor	85 40,cf cf 28,xx xx xx xx	9	H, 32 bits		Dimensionless_PerInputPulseOnChannel0 I Volume_PerInputPulseOnChannel0	1	0	0	0	
	Complementary counter 2 pulse factor	85 80 40,cf cf 28,xx xx xx xx	10	H, 32 bits		Dimensionless_PerInputPulseOnChannel0 I Volume_PerInputPulseOnChannel0	2	0	0	0	
	More records in next telegram	no	1		Start of manufacturer specific data	ManufacturerDataBlock					
	End	Check Sum	cs	1							
		Stop	16	1			Max frame size: 166 bytes				

Max frame size: 166 bytes

**Symbols**

‡ Function: 0=instantaneous, 1=maximum, 2=minimum, 3=during error state

§ manufacturer specific VIFE

**Notes**

1. For non hexadecimal or lower case digits see the detailed description in the Keys sheet.

**Respond with user data** RSP\_UD, Variable structure response (slave to master)

						<MbusRecord> XML attributes					
						Name	SubUnit	Tariff	Storage	Function	Parent tag
Start	Field	Frame bytes in hex (Note 1)	Bytes	Coding	Comment						
	Start, Length	68, Le Le, 68	4								
	Control	08	1		Respond with user data, RSP_UD						
User data	Address	xx	1								
	Control Information	72	1		Variable structure respond						
	Identification number	xx xx xx xx	4	A, 32 bits		IdentificationNumber					<Header>
	Manufacturer ID	EE 4D	2	C, 16 bits	"SON"	Manufacturer					
	Version of meter	1B	1	C, 8 bits	27	Version					
	Device type	dt	1	D, 8 bits		DeviceType					
	Access number	xx	1	C, 8 bits		AccessNumber					
	Status	st	1	Ds, 8 bits		Status					
	Configuration	00 00	2	C, 16 bits		Configuration					
	Volume totalizer stored at month - 1	44, v0, xx xx xx xx	6	B, 32 bits		Volume	0	0	1	0	<Records>
	Volume totalizer stored at month - 2	84 01, v0, xx xx xx xx	7	B, 32 bits		Volume	0	0	2	0	
	Volume totalizer stored at month - 3	C4 01, v0, xx xx xx xx	7	B, 32 bits		Volume	0	0	3	0	
	Volume totalizer stored at month - 4	84 02, v0, xx xx xx xx	7	B, 32 bits		Volume	0	0	4	0	
	Volume totalizer stored at month - 5	C4 02, v0, xx xx xx xx	7	B, 32 bits		Volume	0	0	5	0	
	Volume totalizer stored at month - 6	84 03, v0, xx xx xx xx	7	B, 32 bits		Volume	0	0	6	0	
	Volume totalizer stored at month - 7	C4 03, v0, xx xx xx xx	7	B, 32 bits		Volume	0	0	7	0	
	Volume totalizer stored at month - 8	84 04, v0, xx xx xx xx	7	B, 32 bits		Volume	0	0	8	0	
	Volume totalizer stored at month - 9	C4 04, v0, xx xx xx xx	7	B, 32 bits		Volume	0	0	9	0	
	Volume totalizer stored at month - 10	84 05, v0, xx xx xx xx	7	B, 32 bits		Volume	0	0	10	0	
	Volume totalizer stored at month - 11	C4 05, v0, xx xx xx xx	7	B, 32 bits		Volume	0	0	11	0	
	Volume totalizer stored at month - 12	84 06, v0, xx xx xx xx	7	B, 32 bits		Volume	0	0	12	0	
	Volume totalizer stored at month - 13	C4 06, v0, xx xx xx xx	7	B, 32 bits		Volume	0	0	13	0	
	Volume totalizer stored at month - 14	84 07, v0, xx xx xx xx	7	B, 32 bits		Volume	0	0	14	0	
	Volume totalizer stored at month - 15	C4 07, v0, xx xx xx xx	7	B, 32 bits		Volume	0	0	15	0	
	Volume totalizer stored at month - 16	84 08, v0, xx xx xx xx	7	B, 32 bits		Volume	0	0	16	0	
	Volume totalizer stored at month - 17	C4 08, v0, xx xx xx xx	7	B, 32 bits		Volume	0	0	17	0	
	Volume totalizer stored at month - 18	84 09, v0, xx xx xx xx	7	B, 32 bits		Volume	0	0	18	0	
End	More records in next telegram	no	1		Start of manufacturer specific data	ManufacturerDataBlock					
	Check Sum	cs	1								
	Stop	16	1			Max frame size: 147 bytes					

Max frame size: 147 bytes

**Symbols**

‡ Function: 0=instantaneous, 1=maximum, 2=minimum, 3=during error state

§ manufacturer specific VIFE

**Notes**

1. For non hexadecimal or lower case digits see the detailed description in the Keys sheet.



**Respond with user data** RSP\_UD, Variable structure response (slave to master)

						<MbusRecord> XML attributes					
						Name	SubUnit	Tariff	Storage	Function†	Parent tag
Start	Field	Frame bytes in hex (Note 1)	Bytes	Coding	Comment						
	Start, Length	68, Le Le, 68	4								
	Control	08	1		Respond with user data, RSP_UD						
	Address	xx	1								
User data	Control Information	72	1		Variable structure respond						
	Identification number	xx xx xx xx	4	A, 32 bits		IdentificationNumber					<Header>
	Manufacturer ID	EE 4D	2	C, 16 bits	"SON"	Manufacturer					
	Version of meter	1B	1	C, 8 bits	27	Version					
	Device type	dt	1	D, 8 bits		DeviceType					
	Access number	xx	1	C, 8 bits		AccessNumber					
	Status	st	1	Ds, 8 bits		Status					
	Configuration	00 00	2	C, 16 bits		Configuration					
	Energy totalizer (cooling) stored at month - 1	C4 10,en,xx xx xx xx	7	B, 32 bits		Energy	0	1	1	0	<Records>
	Energy totalizer (cooling) stored at month - 2	84 11,en,xx xx xx xx	7	B, 32 bits		Energy	0	1	2	0	
	Energy totalizer (cooling) stored at month - 3	C4 11,en,xx xx xx xx	7	B, 32 bits		Energy	0	1	3	0	
	Energy totalizer (cooling) stored at month - 4	84 12,en,xx xx xx xx	7	B, 32 bits		Energy	0	1	4	0	
	Energy totalizer (cooling) stored at month - 5	C4 12,en,xx xx xx xx	7	B, 32 bits		Energy	0	1	5	0	
	Energy totalizer (cooling) stored at month - 6	84 13,en,xx xx xx xx	7	B, 32 bits		Energy	0	1	6	0	
	Energy totalizer (cooling) stored at month - 7	C4 13,en,xx xx xx xx	7	B, 32 bits		Energy	0	1	7	0	
	Energy totalizer (cooling) stored at month - 8	84 14,en,xx xx xx xx	7	B, 32 bits		Energy	0	1	8	0	
	Energy totalizer (cooling) stored at month - 9	C4 14,en,xx xx xx xx	7	B, 32 bits		Energy	0	1	9	0	
	Energy totalizer (cooling) stored at month -	84 15,en,xx xx xx xx	7	B, 32 bits		Energy	0	1	10	0	
	Energy totalizer (cooling) stored at month -	C4 15,en,xx xx xx xx	7	B, 32 bits		Energy	0	1	11	0	
	Energy totalizer (cooling) stored at month -	84 16,en,xx xx xx xx	7	B, 32 bits		Energy	0	1	12	0	
	Energy totalizer (cooling) stored at month -	C4 16,en,xx xx xx xx	7	B, 32 bits		Energy	0	1	13	0	
	Energy totalizer (cooling) stored at month -	84 17,en,xx xx xx xx	7	B, 32 bits		Energy	0	1	14	0	
	Energy totalizer (cooling) stored at month -	C4 17,en,xx xx xx xx	7	B, 32 bits		Energy	0	1	15	0	
	Energy totalizer (cooling) stored at month -	84 18,en,xx xx xx xx	7	B, 32 bits		Energy	0	1	16	0	
	Energy totalizer (cooling) stored at month -	C4 18,en,xx xx xx xx	7	B, 32 bits		Energy	0	1	17	0	
	Energy totalizer (cooling) stored at month -	84 19,en,xx xx xx xx	7	B, 32 bits		Energy	0	1	18	0	
	More records in next telegram	mo	1		Start of manufacturer specific data	ManufacturerDataBlock					
End	Check Sum	cs	1								
	Stop	16	1			Max frame size: 148 bytes					

Max frame size: 148 bytes

**Symbols**

‡ Function: 0=instantaneous, 1=maximum, 2=minimum, 3=during error state

§ manufacturer specific VIFE

**Notes**

1. For non hexadecimal or lower case digits see the detailed description in the Keys sheet.

**Respond with user data** RSP\_UD, Variable structure response (slave to master)

Response with user data (RSP_UD - Variable structure response (slave to master))						<MbusRecord> XML attributes						
						Name (Note2)	SubUnit	Tariff	Storage	Function†	Parent tag	
Start	Field	Frame bytes in hex (Note 1)	Bytes	Coding	Comment							
	Start, Length	68 Le Le, 68	4									
	Control	08	1		Respond with user data, RSP_UD							
User data	Address	xx	1									
	Control Information	72	1		Variable structure respond							
	Identification number	xx xx xx xx	4	A, 32 bits		IdentificationNumber					<Header>	
	Manufacturer ID	EE 4D	2	C, 16 bits	"SON"	Manufacturer						
	Version of meter	1B	1	C, 8 bits	27	Version						
	Device type	dt	1	D, 8 bits		DeviceType						
	Access number	xx	1	C, 8 bits		AccessNumber						
	Status	st	1	Ds, 8 bits		Status						
	Configuration	00 00	2	C, 16 bits		Configuration						
	Complementary counter 1 totalizer stored at month -	C4 40,co co,xx xx xx xx	8	B, 32 bits		Dimensionless   Volume	1	0	1	0	<Records>	
	Complementary counter 1 totalizer stored at month -	84 41,co co,xx xx xx xx	8	B, 32 bits		Dimensionless   Volume	1	0	2	0		
	Complementary counter 1 totalizer stored at month -	C4 41,co co,xx xx xx xx	8	B, 32 bits		Dimensionless   Volume	1	0	3	0		
	Complementary counter 1 totalizer stored at month -	84 42,co co,xx xx xx xx	8	B, 32 bits		Dimensionless   Volume	1	0	4	0		
	Complementary counter 1 totalizer stored at month -	C4 42,co co,xx xx xx xx	8	B, 32 bits		Dimensionless   Volume	1	0	5	0		
	Complementary counter 1 totalizer stored at month -	84 43,co co,xx xx xx xx	8	B, 32 bits		Dimensionless   Volume	1	0	6	0		
	Complementary counter 1 totalizer stored at month -	C4 43,co co,xx xx xx xx	8	B, 32 bits		Dimensionless   Volume	1	0	7	0		
	Complementary counter 1 totalizer stored at month -	84 44,co co,xx xx xx xx	8	B, 32 bits		Dimensionless   Volume	1	0	8	0		
	Complementary counter 1 totalizer stored at month -	C4 44,co co,xx xx xx xx	8	B, 32 bits		Dimensionless   Volume	1	0	9	0		
	Complementary counter 1 totalizer stored at month -	84 45,co co,xx xx xx xx	8	B, 32 bits		Dimensionless   Volume	1	0	10	0		
	Complementary counter 1 totalizer stored at month -	C4 45,co co,xx xx xx xx	8	B, 32 bits		Dimensionless   Volume	1	0	11	0		
	Complementary counter 1 totalizer stored at month -	84 46,co co,xx xx xx xx	8	B, 32 bits		Dimensionless   Volume	1	0	12	0		
	Complementary counter 1 totalizer stored at month -	C4 46,co co,xx xx xx xx	8	B, 32 bits		Dimensionless   Volume	1	0	13	0		
	Complementary counter 1 totalizer stored at month -	84 47,co co,xx xx xx xx	8	B, 32 bits		Dimensionless   Volume	1	0	14	0		
	Complementary counter 1 totalizer stored at month -	C4 47,co co,xx xx xx xx	8	B, 32 bits		Dimensionless   Volume	1	0	15	0		
	Complementary counter 1 totalizer stored at month -	84 48,co co,xx xx xx xx	8	B, 32 bits		Dimensionless   Volume	1	0	16	0		
	Complementary counter 1 totalizer stored at month -	C4 48,co co,xx xx xx xx	8	B, 32 bits		Dimensionless   Volume	1	0	17	0		
	Complementary counter 1 totalizer stored at month -	84 49,co co,xx xx xx xx	8	B, 32 bits		Dimensionless   Volume	1	0	18	0		
More records in next telegram	mo	1		Start of manufacturer specific data	ManufacturerDataBlock							
End	Check Sum	cs	1			Max frame size: 166 bytes						
	Stop	16	1									

**Symbols**

‡ Function: 0=instantaneous, 1=maximum, 2=minimum, 3=during error state  
§ manufacturer specific VIFE

**Notes**

- For non hexadecimal or lower case digits see the detailed description in the Keys sheet.
- Depending on the device configuration the kind of some values can be different. Therefore the XML attribute name can be one of the name separated by "|".

**Respond with user data** RSP\_UD, Variable structure response (slave to master)

	Field	Frame bytes in hex (Note 1)	Bytes	Coding	Comment	<MbusRecord> XML attributes					
						Name (Note 2)	SubUnit	Tariff	Storage	Function†	Parent tag
Start	Start Length	68 Le Le, 68	4								
	Control	08	1		Respond with user data, RSP_UD						
	Address	xx	1								
User data	Control Information	72	1		Variable structure respond	IdentificationNumber					<Header>
	Identification number	xx xx xx xx	4	A, 32 bits							
	Manufacturer ID	EE 4D	2	C, 16 bits	"SON"						
	Version of meter	1B	1	C, 8 bits	27						
	Device type	dt	1	D, 8 bits							
	Access number	xx	1	C, 8 bits							
	Status	st	1	Ds, 8 bits							
	Configuration	00 00	2	C, 16 bits							
	Complementary counter 2 totalizer stored at month -	C4 80 40, co co, xx xx xx xx	9	B, 32 bits		Dimensionless   Volume	2	0	1	0	<Records>
	Complementary counter 2 totalizer stored at month -	84 81 40, co co, xx xx xx xx	9	B, 32 bits		Dimensionless   Volume	2	0	2	0	
	Complementary counter 2 totalizer stored at month -	C4 81 40, co co, xx xx xx xx	9	B, 32 bits		Dimensionless   Volume	2	0	3	0	
	Complementary counter 2 totalizer stored at month -	84 82 40, co co, xx xx xx xx	9	B, 32 bits		Dimensionless   Volume	2	0	4	0	
	Complementary counter 2 totalizer stored at month -	C4 82 40, co co, xx xx xx xx	9	B, 32 bits		Dimensionless   Volume	2	0	5	0	
	Complementary counter 2 totalizer stored at month -	84 83 40, co co, xx xx xx xx	9	B, 32 bits		Dimensionless   Volume	2	0	6	0	
	Complementary counter 2 totalizer stored at month -	C4 83 40, co co, xx xx xx xx	9	B, 32 bits		Dimensionless   Volume	2	0	7	0	
	Complementary counter 2 totalizer stored at month -	84 84 40, co co, xx xx xx xx	9	B, 32 bits		Dimensionless   Volume	2	0	8	0	
	Complementary counter 2 totalizer stored at month -	C4 84 40, co co, xx xx xx xx	9	B, 32 bits		Dimensionless   Volume	2	0	9	0	
	Complementary counter 2 totalizer stored at month -	84 85 40, co co, xx xx xx xx	9	B, 32 bits		Dimensionless   Volume	2	0	10	0	
	Complementary counter 2 totalizer stored at month -	C4 85 40, co co, xx xx xx xx	9	B, 32 bits		Dimensionless   Volume	2	0	11	0	
	Complementary counter 2 totalizer stored at month -	84 86 40, co co, xx xx xx xx	9	B, 32 bits		Dimensionless   Volume	2	0	12	0	
	Complementary counter 2 totalizer stored at month -	C4 86 40, co co, xx xx xx xx	9	B, 32 bits		Dimensionless   Volume	2	0	13	0	
	Complementary counter 2 totalizer stored at month -	84 87 40, co co, xx xx xx xx	9	B, 32 bits		Dimensionless   Volume	2	0	14	0	
	Complementary counter 2 totalizer stored at month -	C4 87 40, co co, xx xx xx xx	9	B, 32 bits		Dimensionless   Volume	2	0	15	0	
	Complementary counter 2 totalizer stored at month -	84 88 40, co co, xx xx xx xx	9	B, 32 bits		Dimensionless   Volume	2	0	16	0	
	Complementary counter 2 totalizer stored at month -	C4 88 40, co co, xx xx xx xx	9	B, 32 bits		Dimensionless   Volume	2	0	17	0	
	Complementary counter 2 totalizer stored at month -	84 89 40, co co, xx xx xx xx	9	B, 32 bits		Dimensionless   Volume	2	0	18	0	
	More records in next telegram	mo	1		Start of manufacturer specific data	ManufacturerDataBlock					
End	Check Sum	cs	1								
	Stop	16	1								

Max frame size: 184 bytes

**Symbols**

‡ Function: 0=instantaneous, 1=maximum, 2=minimum, 3=during error state  
§ manufacturer specific VIFE

**Notes**

- For non hexadecimal or lower case digits see the detailed description in the Keys sheet.
- Depending on the device configuration the kind of some values can be different. Therefore the XML attribute name can be one of the name separated by "|".

**Respond with user data** RSP\_UD, Variable structure response (slave to master)

	Field	Frame bytes in hex (Note 1)	Bytes	Coding	Comment	<MbusRecord> XML attributes					
						Name (Note 2)	SubUnit	Tariff	Storage	Function†	Parent tag
Start	Start Length	68, Le Le, 68	4								
	Control	08	1		Respond with user data, RSP_UD						
	Address	xx	1								
	Control Information	72	1		Variable structure respond						
User data	Identification number	xx xx xx xx	4	A, 32 bits		IdentificationNumber					<Header>
	Manufacturer ID	EE 4D	2	C, 16 bits	"SON"	Manufacturer					
	Version of meter	1B	1	C, 8 bits	27	Version					
	Device type	dt	1	D, 8 bits		DeviceType					
	Access number	xx	1	C, 8 bits		AccessNumber					
	Status	st	1	Ds, 8 bits		Status					
	Configuration	00 00	2	C, 16 bits		Configuration					
											<Records>
	Energy unit	01, FF FF 03, eu	5	C, 8 bits	\$	EnergyUnit	0	0	0	0	
	Volume unit	01, FF FF 04, vu	5	C, 8 bits	\$	VolumeUnit	0	0	0	0	
	Complementary counter 1 unit	81 40, FF FF 05, cu	6	C, 8 bits	\$	AuxiliaryInputUnit	1	0	0	0	
	Complementary counter 2 unit	81 80 40, FF FF 05, cu	7	C, 8 bits	\$	AuxiliaryInputUnit	2	0	0	0	
	Wire M-Bus primary address	01, 7A, xx	3	C, 8 bits		PrimaryAddress	0	0	0	0	
	Wire M-Bus baudrate	02, FD 1C, bd bd	5	C, 16 bits		BaudRate	0	0	0	0	
	Flowmeter position	01, FF FF 06, fp	5	C, 8 bits	\$	FlowmeterPosition	0	0	0	0	
	Complementary counter 1 enabled	81 40, FF FF 0D, ce	6	C, 8 bits	\$	AuxiliaryInputEnabled	1	0	0	0	
	Complementary counter 2 enabled	81 80 40, FF FF 0D, ce	7	C, 8 bits	\$	AuxiliaryInputEnabled	2	0	0	0	
	Energy tariff 1 enabled	81 10, FF FF 0E, ee	6	C, 8 bits	\$	TariffType	0	1	0	0	
	Communication module type	01, FF FF 0F, ct	5	C, 8 bits	\$	InterfaceType	0	0	0	0	
	Energy meter type	01, FF FF 10, et	5	C, 8 bits	\$	EnergyMeterType	0	0	0	0	
	Flowmeter model	01, FF FF 12, fm	5	C, 8 bits	\$	FlowmeterModel	0	0	0	0	
	Outputs totalizers sources	03, FF FF 17, o1 o2 o3	7	C, 24bits	\$	TotalizationOutputSource	0	0	0	0	
	Outputs burst totalizers sources	01, FF FF 18, ob	5	D, 8bits	\$	TotalizationBurstOutput	0	0	0	0	
	Complementary counter 1 remainder	85 40, FF 02, xx xx xx xx	8	H, 32 bits	\$	VolumeRemainder	1	0	0	0	
	Complementary counter 2 remainder	85 80 40, FF 02, xx xx xx xx	9	H, 32 bits	\$	VolumeRemainder	2	0	0	0	
	Radio Address	04, FF 1C, xx xx xx xx	7	B, 32 bits	\$ Note 5	MfdRadioAddress	0	0	0	0	
	Firmware check code (CRC16)	02, FF FF 1B, xx xx	6	C, 16 bits	\$	FirmwareCheckCode	0	0	0	0	
	State of parameter	01, FD 66, pp	4	D, 8 bits	\$	StateOfParameterActivation	0	0	0	0	
	LoRaWAN State of parameters	02, FF 48, 1p 1p	5	D, 16 bits	\$	DeviceSpecificValue8	0	0	0	0	
	Delay used when delayed join	01, FF 13, xx	5	C, 8 bits	[min] \$	Timeout	0	0	0	0	
	RF transmission interval	02, FD 3D, xx xx	5	C, 16 bits	[min]	PeriodOfNominalDataTransmissions	0	0	0	0	
	Pulse factor	05, 96 28, xx xx xx xx	7	H, 32 bits	Note 3	Volume_perInputPulseOnChannel0	0	0	0	0	
	Hide totalizers	01, FF FF 11, ht	5	C, 8 bits	\$ Note 3	HiddenTotalizers	0	0	0	0	
End	More records in next telegram	mo	1		Start of manufacturer specific data	ManufacturerDataBlock					
End	Check Sum	cs	1								
	Stop	16	1								

Max frame size: 165 bytes

**Symbols**

‡ Function: 0=instantaneous, 1=maximum, 2=minimum, 3=during error state

\$ manufacturer specific VIFE

**Notes**

- For non hexadecimal or lower case digits see the detailed description in the Keys sheet.
- The installer access right (or higher) is needed to view this value
- The verifier access right (or higher) is needed to view this value
- Warning: the "Radio Address" is coded according to MFD, see "M-Bus SON specific\_rev???.xls" for details

**Respond with user data** RSP\_UD, Variable structure response (slave to master)

	Field	Frame bytes in hex (Note 1)	Bytes	Coding	Comment	<MbusRecord> XML attributes					
						Name (Note 2)	SubUnit	Tarif	Storage	Function†	Parent tag
Start	Start Length	68, Le Le, 68	4								
	Control	08	1		Respond with user data, RSP_UD						
	Address	xx	1								
User data	Control Information	72	1		Variable structure respond						
	Identification number	xx xx xx xx	4	A, 32 bits		IdentificationNumber					<Header>
	Manufacturer ID	EE 4D	2	C, 16 bits	"SON"	Manufacturer					
	Version of meter	1B	1	C, 8 bits	27	Version					
	Device type	dt	1	D, 8 bits		DeviceType					
	Access number	xx	1	C, 8 bits		AccessNumber					
	Status	st	1	Ds, 8 bits		Status					
	Configuration	00 00	2	C, 16 bits		Configuration					
	Type of fluid	01, FF 2E, tf	4	C, 8 bits	\$ Note 2	SpecialFluidType	0	0	0	0	<Records>
	Concentration of fluid	01, FF 2F, xx	4	C, 8 bits	[%] \$ Note 2	SpecialFluidConcentration	0	0	0	0	
	Specific heat polynomial, a0	85 20, FF 2D, xx xx xx xx	8	H, 32 bits	Note 2	Coefficient	0	2	0	0	
	Specific heat polynomial, a1	C5 20, FF 2D, xx xx xx xx	8	H, 32 bits	Note 2	Coefficient	0	2	1	0	
	Specific heat polynomial, a2	85 21, FF 2D, xx xx xx xx	8	H, 32 bits	Note 2	Coefficient	0	2	2	0	
	Specific heat polynomial, a3	C5 21, FF 2D, xx xx xx xx	8	H, 32 bits	Note 2	Coefficient	0	2	3	0	
	Specific heat polynomial, a4	85 22, FF 2D, xx xx xx xx	8	H, 32 bits	Note 2	Coefficient	0	2	4	0	
	Specific heat polynomial, a5	C5 22, FF 2D, xx xx xx xx	8	H, 32 bits	Note 2	Coefficient	0	2	5	0	
	Density polynomial, a0	85 30, FF 2D, xx xx xx xx	8	H, 32 bits	Note 2	Coefficient	0	3	0	0	
	Density polynomial, a1	C5 30, FF 2D, xx xx xx xx	8	H, 32 bits	Note 2	Coefficient	0	3	1	0	
	Density polynomial, a2	85 31, FF 2D, xx xx xx xx	8	H, 32 bits	Note 2	Coefficient	0	3	2	0	
	Density polynomial, a3	C5 31, FF 2D, xx xx xx xx	8	H, 32 bits	Note 2	Coefficient	0	3	3	0	
	Density polynomial, a4	85 32, FF 2D, xx xx xx xx	8	H, 32 bits	Note 2	Coefficient	0	3	4	0	
	Density polynomial, a5	C5 32, FF 2D, xx xx xx xx	8	H, 32 bits	Note 2	Coefficient	0	3	5	0	
	Inverse viscosity polynomial, a0	85 80 10, FF 2D, xx xx xx xx	9	H, 32 bits	Note 2	Coefficient	0	4	0	0	
	Inverse viscosity polynomial, a1	C5 80 10, FF 2D, xx xx xx xx	9	H, 32 bits	Note 2	Coefficient	0	4	1	0	
	Inverse viscosity polynomial, a2	85 81 10, FF 2D, xx xx xx xx	9	H, 32 bits	Note 2	Coefficient	0	4	2	0	
	Inverse viscosity polynomial, a3	C5 81 10, FF 2D, xx xx xx xx	9	H, 32 bits	Note 2	Coefficient	0	4	3	0	
	Inverse viscosity polynomial, a4	85 82 10, FF 2D, xx xx xx xx	9	H, 32 bits	Note 2	Coefficient	0	4	4	0	
	Inverse viscosity polynomial, a5	C5 82 10, FF 2D, xx xx xx xx	9	H, 32 bits	Note 2	Coefficient	0	4	5	0	
	LoRaWAN FPort frame selection	01, FF FF 26, xx	5	C, 8 bits	\$	LoraFPort	0	0	0	0	
	Time Zone	01, FF 1F, xx	4	B, 8 bits	\$, xx*15 min; xx=4 means UTC+01:00	TimeZone	0	0	0	0	
	Encryption method	01, FF FF 39, em	5	C, 8 bits	\$	EncryptionEnabled	0	0	0	0	
	Radio communication mode	01, FF FF 3A, rr	5	C, 8 bits	\$	RadioCommunicationMode	0	0	0	0	
	More records in next telegram	mo	1		Start of manufacturer specific data	ManufacturerDataBlock					
End	Check Sum	cs	1								
	Stop	16	1								

Max frame size: 199 bytes

**Symbols**

‡ Function: 0=instantaneous, 1=maximum, 2=minimum, 3=during error state

\$ manufacturer specific VIFE

**Notes**

- For non hexadecimal or lower case digits see the detailed description in the Keys sheet.
- The installer access right (or higher) is needed to view this value
- The verifier access right (or higher) is needed to view this value

**Respond with user data** RSP\_UD, Variable structure response (slave to master)

						<MbusRecord> XML attributes					Parent tag
						Name (Note2)	SubUnit	Tarif	Storage	Function†	
Start	Field	Frame bytes in hex (Note 1)	Bytes	Coding	Comment						
	Start Length	68, Le, 68	4								
	Control	08	1		Respond with user data, RSP_UD						
	Address	xx	1								
User data	Control Information	72	1		Variable structure respond						
	Identification number	xx xx xx xx	4	A, 32 bits		IdentificationNumber					<Header>
	Manufacturer ID	EE 4D	2	C, 16 bits	"SON"	Manufacturer					
	Version of meter	1B	1	C, 8 bits	27	Version					
	Device type	dt	1	D, 8 bits		DeviceType					
	Access number	xx	1	C, 8 bits		AccessNumber					
	Status	st	1	Ds, 8 bits		Status					
	Configuration	00 00	2	C, 16 bits		Configuration					
											<Records>
	Flow compensation method	01, FF FF 14, cc	5	C, 8 bits	\$ Note 3	FlowCompensationMethod	0	0	0	0	
	Flow deviation curve, temperature	85 90 10, 5B, xx xx xx xx	8	H, 32 bits	Note 3	Flow Temperature	0	5	0	0	
	Flow cut off	85 90 10, BE 40, xx xx xx xx	9	H, 32 bits	Note 3	VolumeFlow_LowerLimitOf	0	5	0	0	
	Flow saturation	85 90 10, BE 48, xx xx xx xx	9	H, 32 bits	Note 3	VolumeFlow_UpperLimitOf	0	5	0	0	
	Flow deviation curve, flow point 0	85 90 10, FF 2D, xx xx xx xx	9	H, 32 bits	Note 3 and note A	Coefficient	0	5	0	0	
	Flow deviation curve, flow point 1	C5 90 10, FF 2D, xx xx xx xx	9	H, 32 bits	Note 3 and note A	Coefficient	0	5	1	0	
	Flow deviation curve, flow point 2	85 91 10, FF 2D, xx xx xx xx	9	H, 32 bits	Note 3 and note A	Coefficient	0	5	2	0	
	Flow deviation curve, flow point 3	C5 91 10, FF 2D, xx xx xx xx	9	H, 32 bits	Note 3 and note A	Coefficient	0	5	3	0	
	Flow deviation curve, flow point 4	85 92 10, FF 2D, xx xx xx xx	9	H, 32 bits	Note 3 and note A	Coefficient	0	5	4	0	
	Flow deviation curve, flow point 5	C5 92 10, FF 2D, xx xx xx xx	9	H, 32 bits	Note 3 and note A	Coefficient	0	5	5	0	
	Flow deviation curve, flow point 6	85 93 10, FF 2D, xx xx xx xx	9	H, 32 bits	Note 3 and note A	Coefficient	0	5	6	0	
	Flow deviation curve, flow point 7	C5 93 10, FF 2D, xx xx xx xx	9	H, 32 bits	Note 3 and note A	Coefficient	0	5	7	0	
	Flow deviation curve, flow point 8	85 94 10, FF 2D, xx xx xx xx	9	H, 32 bits	Note 3 and note A	Coefficient	0	5	8	0	
	Flow deviation curve, flow point 9	C5 94 10, FF 2D, xx xx xx xx	9	H, 32 bits	Note 3 and note A	Coefficient	0	5	9	0	
	Flow deviation curve, flow point 10	85 95 10, FF 2D, xx xx xx xx	9	H, 32 bits	Note 3 and note A	Coefficient	0	5	10	0	
	Flow deviation curve, flow point 11	C5 95 10, FF 2D, xx xx xx xx	9	H, 32 bits	Note 3 and note A	Coefficient	0	5	11	0	
	Flow deviation curve, flow point 12	85 96 10, FF 2D, xx xx xx xx	9	H, 32 bits	Note 3 and note A	Coefficient	0	5	12	0	
	Flow deviation curve, flow point 13	C5 96 10, FF 2D, xx xx xx xx	9	H, 32 bits	Note 3 and note A	Coefficient	0	5	13	0	
	Flow deviation curve, flow point 14	85 97 10, FF 2D, xx xx xx xx	9	H, 32 bits	Note 3 and note A	Coefficient	0	5	14	0	
	Flow deviation curve, flow point 15	C5 97 10, FF 2D, xx xx xx xx	9	H, 32 bits	Note 3 and note A	Coefficient	0	5	15	0	
	More records in next telegram	mo	1		Start of manufacturer specific data	ManufacturerDataBlock					
End	Check Sum	cs	1								
	Stop	16	1								

Max frame size: 197 bytes

**Symbols**

‡ Function: 0=instantaneous, 1=maximum, 2=minimum, 3=during error state  
§ manufacturer specific VIFE

**Notes**

- For non hexadecimal or lower case digits see the detailed description in the Keys sheet.
  - The installer access right (or higher) is needed to view this value
  - The verifier access right (or higher) is needed to view this value
- A. The order of points must be crescent and two same points are not allowed

**Respond with user data** RSP\_UD, Variable structure response (slave to master)

	Field	Frame bytes in hex (Note 1)	Bytes	Coding	Comment	<MbusRecord> XML attributes					Parent tag
						Name (Note 2)	SubUnit	Tariff	Storage	Function†	
Start	Start, Length	68, Le Le, 68	4								
	Control	08	1		Respond with user data, RSP_UD						
	Address	xx	1								
User data	Control Information	72	1		Variable structure respond						
	Identification number	xx xx xx xx	4	A, 32 bits		IdentificationNumber					<Header>
	Manufacturer ID	EE 4D	2	C, 16 bits	"SON"	Manufacturer					
	Version of meter	1B	1	C, 8 bits	27	Version					
	Device type	dt	1	D, 8 bits		DeviceType					
	Access number	xx	1	C, 8 bits		AccessNumber					
	Status	st	1	Ds, 8 bits		Status					
	Configuration	00 00	2	C, 16 bits		Configuration					
	Flow deviation curve, deviation point 0	85 A0 10, FF 2D, xx xx xx xx	9	H, 32 bits	Note 3	Coefficient	0	6	0	0	<Records>
	Flow deviation curve, deviation point 1	C5 A0 10, FF 2D, xx xx xx xx	9	H, 32 bits	Note 3	Coefficient	0	6	1	0	
	Flow deviation curve, deviation point 2	85 A1 10, FF 2D, xx xx xx xx	9	H, 32 bits	Note 3	Coefficient	0	6	2	0	
	Flow deviation curve, deviation point 3	C5 A1 10, FF 2D, xx xx xx xx	9	H, 32 bits	Note 3	Coefficient	0	6	3	0	
	Flow deviation curve, deviation point 4	85 A2 10, FF 2D, xx xx xx xx	9	H, 32 bits	Note 3	Coefficient	0	6	4	0	
	Flow deviation curve, deviation point 5	C5 A2 10, FF 2D, xx xx xx xx	9	H, 32 bits	Note 3	Coefficient	0	6	5	0	
	Flow deviation curve, deviation point 6	85 A3 10, FF 2D, xx xx xx xx	9	H, 32 bits	Note 3	Coefficient	0	6	6	0	
	Flow deviation curve, deviation point 7	C5 A3 10, FF 2D, xx xx xx xx	9	H, 32 bits	Note 3	Coefficient	0	6	7	0	
	Flow deviation curve, deviation point 8	85 A4 10, FF 2D, xx xx xx xx	9	H, 32 bits	Note 3	Coefficient	0	6	8	0	
	Flow deviation curve, deviation point 9	C5 A4 10, FF 2D, xx xx xx xx	9	H, 32 bits	Note 3	Coefficient	0	6	9	0	
	Flow deviation curve, deviation point 10	85 A5 10, FF 2D, xx xx xx xx	9	H, 32 bits	Note 3	Coefficient	0	6	10	0	
	Flow deviation curve, deviation point 11	C5 A5 10, FF 2D, xx xx xx xx	9	H, 32 bits	Note 3	Coefficient	0	6	11	0	
	Flow deviation curve, deviation point 12	85 A6 10, FF 2D, xx xx xx xx	9	H, 32 bits	Note 3	Coefficient	0	6	12	0	
	Flow deviation curve, deviation point 13	C5 A6 10, FF 2D, xx xx xx xx	9	H, 32 bits	Note 3	Coefficient	0	6	13	0	
	Flow deviation curve, deviation point 14	85 A7 10, FF 2D, xx xx xx xx	9	H, 32 bits	Note 3	Coefficient	0	6	14	0	
	Flow deviation curve, deviation point 15	C5 A7 10, FF 2D, xx xx xx xx	9	H, 32 bits	Note 3	Coefficient	0	6	15	0	
	LoRaWAN DevEUI	0D, FF FF 24, 08, xx xx xx xx xx xx	13	LVAR	§	LoraDevEUI	0	0	0	0	
	LoRaWAN JoinEUI	0D, FF FF 25, 08, xx xx xx xx xx xx	13	LVAR	§	LoraJoinEUI	0	0	0	0	
	Radio activity calendar	8D 20, FD 76, E7 hh hh hh ww mm mm	12	LVAR	§	DataContainerForManufacturerProtocol	0	2	0	0	
	Radio scan counter   Radio sent OMS counter   LoRaWAN uplink counter	84 A0 20, FD 61, xx xx xx xx	9	C, 32 bits		CumulationCounter	0	10	0	0	
	Radio carrier counter   Radio sent encrypted OMS counter   LoRaWAN downlink counter	84 B0 20, FD 61, xx xx xx xx	9	C, 32 bits		CumulationCounter	0	11	0	0	
	Radio wakeup counter   Radio sent Walkby counter   LoRaWAN join request successful counter	84 80 30, FD 61, xx xx xx xx	9	C, 32 bits		CumulationCounter	0	12	0	0	
	Radio received frames counter   Radio sent encrypted Walkby counter   LoRaWAN join request failed	84 90 30, FD 61, xx xx xx xx	9	C, 32 bits		CumulationCounter	0	13	0	0	
	Radio sent frames counter   Not used   LoRaWAN cumulated sending time counter	84 A0 30, FD 61, xx xx xx xx	9	C, 32 bits	Note 4	CumulationCounter	0	14	0	0	
	More records in next telegram	mo	1		Start of manufacturer specific data	ManufacturerDataBlock					
End	Check Sum	cs	1								
	Stop	16	1								

Max frame size: 249 bytes

**Symbols**

† Function: 0=instantaneous, 1=maximum, 2=minimum, 3=during error state  
§ manufacturer specific VIFE

**Notes**

- For non hexadecimal or lower case digits see the detailed description in the Keys sheet.
- The installer access right (or higher) is needed to view this value
- The verifier access right (or higher) is needed to view this value
- LoRaWAN cumulated sending time counter: The counter is incremented after each uplink with the value below  
SF12: 32 SF11: 16 SF10: 8  
SF9: 4 SF8: 2 SF7: 1

**Respond with user data** RSP\_UD, Variable structure response (slave to master)

	Field	Frame bytes in hex (Note 1)	Bytes	Coding	Comment	<MbusRecord> XML attributes					
						Name (Note 2)	SubUnit	Tarif	Storage	Function†	Parent tag
Start	Start Length	68, Le, Le, 68	4								
	Control	08	1		Respond with user data, RSP_UD						
	Address	xx	1								
User data	Control Information	72	1		Variable structure respond						
	Identification number	xx xx xx xx	4	A, 32 bits		IdentificationNumber					<Header>
	Manufacturer ID	EE 4D	2	C, 16 bits	"SON"	Manufacturer					
	Version of meter	1B	1	C, 8 bits	27	Version					
	Device type	dt	1	D, 8 bits		DeviceType					
	Access number	xx	1	C, 8 bits		AccessNumber					
	Status	st	1	Ds, 8 bits		Status					
	Configuration	00 00	2	C, 16 bits		Configuration					
	Fabrication Number	0C, 78, xx xx xx xx	6	A, 32 bits		FabricationNumber	0	0	0	0	<Records>
	High temperature	05, 5B, xx xx xx xx	6	H, 32 bits	[°C]	FlowTemperature	0	0	0	0	
	Low temperature	05, 5F, xx xx xx xx	6	H, 32 bits	[°C]	ReturnTemperature	0	0	0	0	
	Flow	05, 3E, xx xx xx xx	6	H, 32 bits	[m3/h]	VolumeFlow	0	0	0	0	
	Power	05, 2B, xx xx xx xx	6	H, 32 bits	[W]	Power	0	0	0	0	
	Energy totalizer heating test	84 C0 40, en, xx xx xx xx	8	B, 32 bits		Energy	3	0	0	0	
	Energy remainder heating test	85 C0 40, FF 01, xx xx xx xx	9	H, 32 bits	\$ Ж	EnergyRemainder	3	0	0	0	
	Volume totalizer test	84 C0 40, vo, xx xx xx xx	8	B, 32 bits		Volume	3	0	0	0	
	Volume remainder test	85 C0 40, FF 02, xx xx xx xx	9	H, 32 bits	\$ Ж	VolumeRemainder	3	0	0	0	
	Energy totalizer cooling test	84 D0 40, en, xx xx xx xx	8	B, 32 bits		Energy	3	1	0	0	
	Energy remainder cooling test	85 D0 40, FF 01, xx xx xx xx	9	H, 32 bits	\$ Ж	EnergyRemainder	3	1	0	0	
	More records in next telegram	mo	1		Start of manufacturer specific data	ManufacturerDataBlock					
	Check Sum	cs	1								
	Stop	16	1								

Max frame size: 103 bytes

**Symbols**

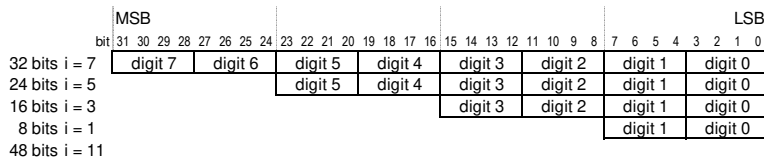
† Function: 0=instantaneous, 1=maximum, 2=minimum, 3=during error state

\$ manufacturer specific VIFE

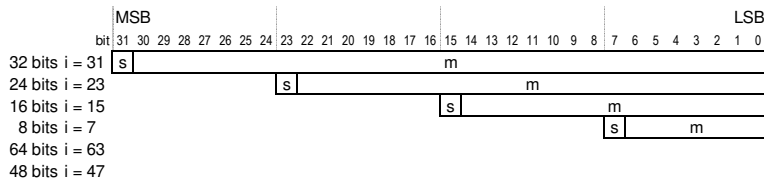
**Notes**

- For non hexadecimal or lower case digits see the detailed description in the Keys sheet.
  - Depending on the device configuration the kind of some values can be different. Therefore the XML attribute name can be one of the name separated by "|".
- Ж. This remainder value must be added to the totalizer value before apply vif unit resolution

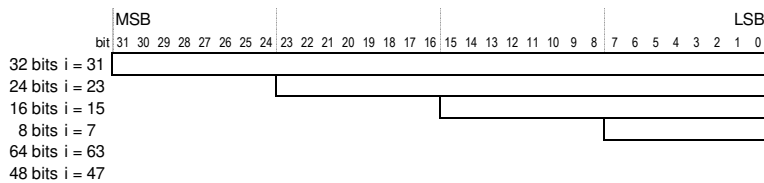


**Type A** Unsigned integer BCD

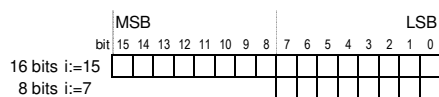
$\text{bit}[x] : 0, 1$   
 $\text{digit}[x] : 0 \dots 9$   
 $\text{digit}[x] = \text{bit}[x \cdot 4 + 3] \cdot 2^3 + \text{bit}[x \cdot 4 + 2] \cdot 2^2 + \text{bit}[x \cdot 4 + 1] \cdot 2^1 + \text{bit}[x \cdot 4 + 0] \cdot 2^0$   
 $\text{number} = \text{digit}[i] \cdot 10^i + \text{digit}[i-1] \cdot 10^{i-1} + \text{digit}[i-2] \cdot 10^{i-2} + \dots + \text{digit}[0] \cdot 10^0$   
 $\text{range} : 0 \dots 10^{(i+1)} - 1$

**Type B** Binary integer

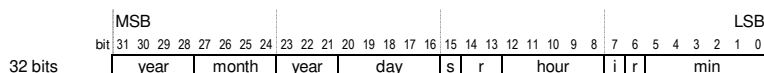
$\text{bit}[x] : 0, 1$   
 $m = \text{bit}[i-1] \cdot 2^{(i-1)} + \text{bit}[i-2] \cdot 2^{(i-2)} + \dots + \text{bit}[0] \cdot 2^0$   
 $\text{Sign} : 0=\text{positive}, 1=\text{negative}$   
 $\text{If Sign}(\text{bit}[i]) = \text{positive Then number} = m$   
 $\text{If Sign}(\text{bit}[i]) = \text{negative Then number} = m - 2^i$   
 $\text{range} : -2^i \dots +(2^i)-1$

**Type C** Unsigned integer

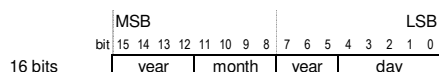
$\text{bit}[x] : 0, 1$   
 $\text{number} = \text{bit}[i] \cdot 2^i + \text{bit}[i-1] \cdot 2^{(i-1)} + \text{bit}[i-2] \cdot 2^{(i-2)} + \dots + \text{bit}[0] \cdot 2^0$   
 $\text{range} : 0 \dots +2^{(i+1)} - 1$

**Type D** Array of Boolean

bit[x] : 0, 1  
 Boolean : 0=false, 1=true  
 Flag[i] = Boolean( bit[i] )  
 Flag[i-1] = Boolean( bit[i-1] )  
 ...  
 Flag[0] = Boolean( bit[0] )

**Type F** Date and Time

bit[x] : 0, 1  
 min : 0 .. 59      min = bit[5]\*2<sup>5</sup> + ... + bit[0]\*2<sup>0</sup>  
 hour : 0 .. 23      hour = bit[12]\*2<sup>4</sup> + ... + bit[8]\*2<sup>0</sup>  
 day : 1 .. 31      day = bit[20]\*2<sup>4</sup> + ... + bit[16]\*2<sup>0</sup>  
 month : 1 .. 12      month = bit[27]\*2<sup>3</sup> + ... + bit[24]\*2<sup>0</sup>  
 year : 0 .. 99      year = bit[31]\*2<sup>6</sup> + ... + bit[28]\*2<sup>3</sup> + bit[23]\*2<sup>2</sup> + ... + bit[21]\*2<sup>0</sup>  
 s : standard time (bit[15]=0), summer time (bit[15]=1)  
 i : valid (bit[7]=0), invalid (bit[7]=1)  
 r : reserved (bit[6],bit[13],bit[14] are always 0)

**Type G** Date

bit[x] : 0, 1  
 day : 1 .. 31      day = bit[4]\*2<sup>4</sup> + ... + bit[0]\*2<sup>0</sup>  
 month : 1 .. 12      month = bit[11]\*2<sup>3</sup> + ... + bit[8]\*2<sup>0</sup>  
 year : 0 .. 99      year = bit[15]\*2<sup>6</sup> + ... + bit[12]\*2<sup>3</sup> + bit[7]\*2<sup>2</sup> + ... + bit[5]\*2<sup>0</sup>

**Type H**      Floating point (IEEE STD 754)

32 bits

bit

31 30 29 28 27 26 25 24 23 22 21 20 19 18 17 16 15 14 13 12 11 10 9 8 7 6 5 4 3 2 1 0

MSB

LSB

s	e	m
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bit[x] : 0, 1

m = bit[22]\*2<sup>-1</sup> + bit[21]\*2<sup>-2</sup> + ... + bit[0]\*2<sup>-23</sup>

e = bit[30]\*2<sup>7</sup> + bit[29]\*2<sup>6</sup> + ... + bit[23]\*2<sup>0</sup>

s = -1<sup>bit[31]</sup>

If (e>0) AND (e<255)      Then number = s \* 2<sup>^(e-127)</sup> \* ( 1 + m )

If (e=0) AND (m<>0)      Then number = s \* 2<sup>^(e-126)</sup> \* m

If (e=0) AND (m=0)      Then number = s \* 0

If (e=255) AND (m=0)      Then number = s \* infinite

If (e=255) AND (m<>0)      Then number = not a number

**Type Ds**      Status, array of boolean

8 bits

bit

7 6 5 4 3 2 1 0

Error3	Error2	Error1	Temporary	Permanent	Power	Application
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bit[x] : 0, 1

Application = bit[1]\*2<sup>1</sup> + bit[0]\*2<sup>0</sup>

Application : 0=no error, 1=busy, 2=error, 3=reserved

Power : 1=power low

Permanent : 1=permanent error

Temporary : 1=temporary error

Error1 : 1=flow measurement error (specific Sontex 739)

Error2 : 1=temperature measurement error (specific Sontex 739)