Endress+Hauser
People for Process Automation

Liquiline CM44x - Revision 2

HART Field Device Specification

Document: E+H Liquiline CM44x LIT-18, Revision 6

SD01187C/07/EN/04.23 / 71640221

Initial release: 08-Dec-2010
Current release: 01-Dec-2023

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1. Introduction

1.1. Scope

The Endress+Hauser analysis transmitter, model Liquiline CM44x and CM44xR complies with HART protocol revision 7.
This document specifies all the device specific features and documents HART protocol implementation details. The functionality of this field device is described sufficiently to allow its proper application in a process and its complete support in HART capable host applications.

1.2. Purpose

This specification is designed to complement the operating instructions (BA00444C or BA01225C and BA00486C) by providing a complete, unambiguous description of this field device from a HART communication perspective.

1.3. Who should use this document?

The specification is designed to be a technical reference for HART capable host application developers, system integrators and experienced end users. It also provides functional specifications (e.g., commands, enumerations and performance requirements) used during field device development, maintenance and testing. This document assumes the reader is familiar with HART protocol requirements and terminology.

1.4. Abbreviations and definitions

FSK: Frequency shift keying
FCG: FieldComm Group
n. A.: Not applicable
NaN: Not a number (an IEEE-754 floating point value representing no number, 0x7F A0 00 00)
ENP: Electronic nameplate

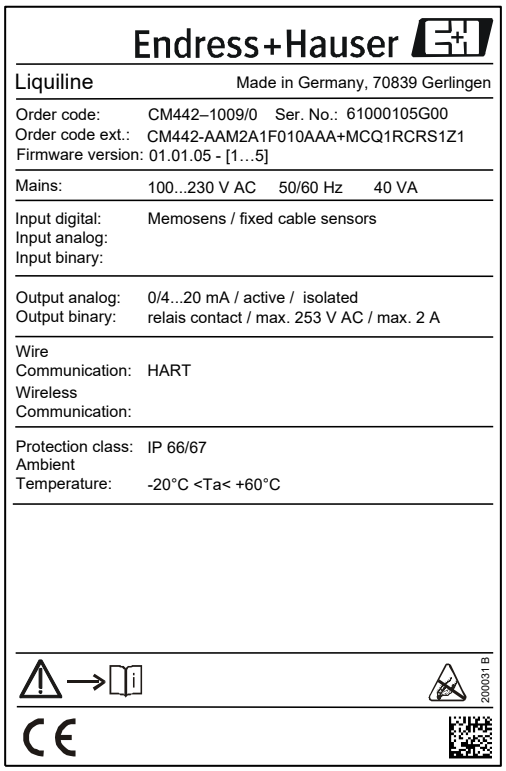
1.5. References

HCF_SPEC-12: HART Smart Communications Protocol Specification. Available from the FCG.
BA00444C: Liquiline CM44x Operating instructions.
BA01225C: Liquiline CM44xR Operating instructions.
BA00486C: Liquiline CM44x Operating instructions (Communication via the HART protocol).

2. Device identification

Manufacturer name:	Endress+Hauser
Model name:	Liquiline CM44x
Manufacturer ID code:	17 (0x11)
Device type code:	156 (0x9C)
Expanded device type code:	4508 (0x119C)
HART protocol revision:	7
Device revision:	2
Number of device variables:	32
Physical layers supported:	FSK
Physical device category:	Transmitter, DC isolated bus device

The nameplate is located on the right side of the housing and indicates the model name, order codes, serial number and software version. The device revision and unique and polling addresses are shown in the diagnostics menu.


Endress+Hauser

Liquiline — Made in Germany, 70839 Gerlingen

Order code: CM442–1009/0 Ser. No.: 61000105G00
Order code ext.: CM442-AAM2A1F010AAA+MCQ1RCRS1Z1
Firmware version: 01.01.05 - [1…5]

Mains: 100...230 V AC 50/60 Hz 40 VA

Input digital: Memosens / fixed cable sensors
Input analog:
Input binary:

Output analog: 0/4...20 mA / active / isolated
Output binary: relais contact / max. 253 V AC / max. 2 A

Wire Communication: HART
Wireless Communication:

Protection class: IP 66/67
Ambient Temperature: -20°C <Ta< +60°C

200031 B

A nameplate example

Liquiline CM44x


Liquiline CM44xR

3. Product overview

Liquiline is a complex liquid analysis transmitter, with at least one active 4-to-20 mA output (only output 1 is HART capable). Different plug and play sensors (Memosens) can be connected for different use cases.

4. Product interfaces

4.1. Process interface

4.1.1. Sensor input channels

Depending on the Liquiline version different sensors can be connected to different terminals. Please refer to the operating instructions shipped with your Liquiline.

4.2. Host interface

Depending on the Liquiline version different current outputs can be connected to different terminals. Please refer to the operating instructions shipped with your Liquiline.

4.2.1. Analog output 1

This output is present in all Liquiline versions. It represents a value selected by the user. The user can choose this value from a list of values depending on the number and types of the connected sensors. Even mathematical functions or controllers can be set as source for current output.
Depending on the selection the output is scaled according to the configured range of the instrument. The selected value unit may furthermore depend on the operating mode (e.g., saturation or concentration measurement).
Analog output 1 corresponds to the HART primary variable. HART communication is supported on this loop, only.
Linear overrange is possible from 3.8 mA to 20.5 mA. Device malfunction can be indicated by error current if selected. Current values are shown in the table below:

Downwards linear overrange:	3.8 mA
Upwards linear overrange:	20.5 mA
Device malfunction indication:	user selectable
Minimum current:	2.4 mA
Maximum current:	23.0 mA
Multidrop current draw:	4.0 mA (during boot: 0.0 mA)
Lift-off voltage:	n. A.

Current outputs can be set to 0..20 mA or 4..20 mA range. If 0..20 mA is selected HART communication is switched off.

4.2.2. Other analog outputs

Up to 8 current outputs can be present. The outputs 2..8 are not HART capable. The sources of all current outputs can be selected by the user.
Linear overrange is possible from 3.8 mA to 20.5 mA. Current values are shown in the table below:

Downwards linear overrange:	3.8 mA
Upwards linear overrange:	20.5 mA
Device malfunction indication:	user selectable
Minimum current:	2.4 mA
Maximum current:	23.0 mA
Multidrop current draw:	n. A.
Lift-off voltage:	n. A.

4.3. Local interfaces, jumpers and switches

4.3.1. Local controls and displays

Liquiline has four buttons, one navigator and a large dot matrix LC display for user interaction. All buttons and the navigator are software controlled. For detailed information refer to the operating instructions.

4.3.2. Internal jumpers and switches

There are no controls inside of the housing.

5. Device variables

5.1. Overview

Liquiline is a plug and play device. That means any available digital sensor (“Memosens”) can be connected to any input. Because of this variable configuration the device variables are variable, too.
There are 4 different groups of device variables:

0..15:	These device variables can be selected by the user
16..23:	These device variables represent measurement values assigned to current outputs 1..8
24..31:	These device variables represent currents of current outputs 1..8
243..249:	Standardized device variables

5.2. User selectable device variables

Device variables in the range from 0 to 15 have to be set up in the Liquiline setup menu. Every of these device variables can be mapped to any present measurement value. The following subchapters describe the possible measurement values for each sensor or module.

5.2.1. Limits

Device variable lower and upper limits shown in the following chapters are absolute maximum limits for the according device variable class. The actual connected sensor might have narrower limits. Upper and lower transducer limits reflect the measuring range supported by the actual sensor. Actual sensor limits can be found in the sensor calibration certificate.

5.2.2. pH glass sensor values

Raw value mV

This value returns the damped raw voltage measured by the electrode.

Device variable classification:	EMF/Voltage	83 (0x53)
Device family:	Not used	250 (0xFA)
Device variable unit:	mV, V	36, 58 (0x24, 0x3A)
Device variable lower limit:	-5000 mV	
Device variable upper limit:	25000 mV	
Device variable damping possible:	Yes	

Temperature

This value returns the damped temperature measured by the electrode.

Device variable classification:	Temperature	64 (0x40)
Device family:	Not used	250 (0xFA)
Device variable units:	°C, °F, K	32, 33, 35 (0x20, 0x21, 0x23)
Device variable lower limit:	-100 °C	
Device variable upper limit:	500 °C	
Device variable damping possible:	Yes	

pH

This value returns the damped temperature compensated pH value.

Device variable classification:	Analytical	81 (0x51)
Device family:	Not used	250 (0xFA)
Device variable unit:	pH	59 (0x3B)
Device variable lower limit:	-2 pH	
Device variable upper limit:	16 pH	
Device variable damping possible:	Yes	

Glass impedance

This value returns the glass impedance of the electrode.

Device variable classification:	Resistance	85 (0x55)
Device family:	Not used	250 (0xFA)
Device variable unit:	kΩ, MΩ	163, 170 (0xA3, 0xAA)
Device variable lower limit:	0 MΩ	
Device variable upper limit:	2e7 MΩ	
Device variable damping possible:	No	

5.2.3. pH isfet sensor values

Raw value mV

This value returns the damped raw voltage measured by the electrode.

Device variable classification:	EMF/Voltage	83 (0x53)
Device family:	Not used	250 (0xFA)
Device variable unit:	mV, V	36, 58 (0x24,0x3A)
Device variable lower limit:	-5000 mV	
Device variable upper limit:	25000 mV	
Device variable damping possible:	Yes	

Temperature

This value returns the damped temperature measured by the electrode.

Device variable classification:	Temperature	64 (0x40)
Device family:	Not used	250 (0xFA)
Device variable units:	°C, °F, K	32, 33, 35 (0x20, 0x21, 0x23)
Device variable lower limit:	-100 °C	
Device variable upper limit:	500 °C	
Device variable damping possible:	Yes	

pH

This value returns the damped temperature compensated pH value.

Device variable classification:	Analytical	81 (0x51)
Device family:	Not used	250 (0xFA)
Device variable unit:	pH	59 (0x3B)
Device variable lower limit:	-2 pH	
Device variable upper limit:	16 pH	
Device variable damping possible:	Yes	

5.2.4. Redox/ORP sensor values

ORP mV

This value returns the damped raw voltage measured by the electrode.

Device variable classification:	EMF/Voltage	83 (0x53)
Device family:	Not used	250 (0xFA)
Device variable unit:	mV, V	36, 58 (0x24, 0x3A)
Device variable lower limit:	-5000 mV	
Device variable upper limit:	25000 mV	
Device variable damping possible:	Yes	

ORP %

This value returns the ORP % value.

Device variable classification:	Analytical	81 (0x51)
Device family:	Not used	250 (0xFA)
Device variable unit:	%	57 (0x39)
Device variable lower limit:	-100 %	
Device variable upper limit:	1000 %	
Device variable damping possible:	Yes	

Temperature

This value returns the damped temperature measured by the electrode.

Device variable classification:	Temperature	64 (0x40)
Device family:	Not used	250 (0xFA)
Device variable units:	°C, °F, K	32, 33, 35 (0x20, 0x21, 0x23)
Device variable lower limit:	-100 °C	
Device variable upper limit:	500 °C	
Device variable damping possible:	Yes	

Reference impedance

This value returns the reference impedance of the electrode if supported by electrode.

Device variable classification:	Resistance	85 (0x55)
Device family:	Not used	250 (0xFA)
Device variable unit:	kΩ, MΩ	163, 170 (0xA3, 0xAA)
Device variable lower limit:	0 MΩ	
Device variable upper limit:	2e7 MΩ	
Device variable damping possible:	No	

5.2.5. pH/ORP sensor values

rH

This value returns the damped temperature compensated pH value.

Device variable classification:	Analytical	81 (0x51)
Device family:	Not used	250 (0xFA)
Device variable unit:	rH	247 (0xF7)
Device variable lower limit:	0 rH	
Device variable upper limit:	100 rH	
Device variable damping possible:	No	

ORP mV

This value returns the damped raw voltage measured by the electrode.

Device variable classification:	EMF/Voltage	83 (0x53)
Device family:	Not used	250 (0xFA)
Device variable unit:	mV, V	36, 58 (0x24, 0x3A)
Device variable lower limit:	-5000 mV	
Device variable upper limit:	25000 mV	
Device variable damping possible:	Yes	

ORP %

This value returns the ORP % value.

Device variable classification:	Analytical	81 (0x51)
Device family:	Not used	250 (0xFA)
Device variable unit:	%	57 (0x39)
Device variable lower limit:	-100 %	
Device variable upper limit:	1000 %	
Device variable damping possible:	Yes	

Raw value mV

This value returns the damped raw voltage measured by the electrode.

Device variable classification:	EMF/Voltage	83 (0x53)
Device family:	Not used	250 (0xFA)
Device variable unit:	mV, V	36, 58 (0x24, 0x3A)
Device variable lower limit:	-5000 mV	
Device variable upper limit:	25000 mV	
Device variable damping possible:	Yes	

Temperature

This value returns the damped temperature measured by the electrode.

Device variable classification:	Temperature	64 (0x40)
Device family:	Not used	250 (0xFA)
Device variable units:	°C, °F, K	32, 33, 35 (0x20, 0x21, 0x23)
Device variable lower limit:	-100 °C	
Device variable upper limit:	500 °C	
Device variable damping possible:	Yes	

pH

This value returns the damped temperature compensated pH value.

Device variable classification:	Analytical	81 (0x51)
Device family:	Not used	250 (0xFA)
Device variable unit:	pH	59 (0x3B)
Device variable lower limit:	-2 pH	
Device variable upper limit:	16 pH	
Device variable damping possible:	Yes	

Glass impedance

This value returns the glass impedance of the electrode.

Device variable classification:	Resistance	85 (0x55)
Device family:	Not used	250 (0xFA)
Device variable unit:	kΩ, MΩ	163, 170 (0xA3, 0xAA)
Device variable lower limit:	0 MΩ	
Device variable upper limit:	2e7 MΩ	
Device variable damping possible:	No	

Reference impedance

This value returns the reference impedance of the electrode.

Device variable classification:	Resistance	85 (0x55)
Device family:	Not used	250 (0xFA)
Device variable unit:	kΩ, MΩ	163, 170 (0xA3, 0xAA)
Device variable lower limit:	0 MΩ	
Device variable upper limit:	2e7 MΩ	
Device variable damping possible:	No	

5.2.6. ISE multi sensor values

Raw value

This value returns the raw voltage value of the corresponding electrode.

Device variable classification:	EMF/Voltage	83 (0x53)
Device family:	Not used	250 (0xFA)
Device variable unit:	mV, V	36, 58 (0x24, 0x3A)
Device variable lower limit:	-5000 mV	
Device variable upper limit:	25000 mV	
Device variable damping possible:	No	

Temperature

This value returns the damped temperature measured by the electrode.

Device variable classification:	Temperature	64 (0x40)
Device family:	Not used	250 (0xFA)
Device variable units:	°C, °F, K	32, 33, 35 (0x20, 0x21, 0x23)
Device variable lower limit:	-100 °C	
Device variable upper limit:	500 °C	
Device variable damping possible:	Yes	

Concentration

This value returns the damped concentration of nitrate, ammonium, potassium or chloride, depending on the electrode type.

Device variable classification:	Mass per volume	73 (0x49)
Device family:	Not used	250 (0xFA)
Device variable units:	µg/l, mg/l	146, 170 (0x92, 0xAA)
	g/ml, kg/l, g/l	95, 96, 97 (0x5F, 0x60, 0x61)
Device variable lower limit:	-1e7 µg/l	
Device variable upper limit:	2e9 µg/l	
Device variable damping possible:	Yes	

pH

This value returns the damped temperature compensated pH value.

Device variable classification:	Analytical	81 (0x51)
Device family:	Not used	250 (0xFA)
Device variable unit:	pH	59 (0x3B)
Device variable lower limit:	-2 pH	
Device variable upper limit:	16 pH	
Device variable damping possible:	Yes	

ORP mV

This value returns the ORP voltage of the electrode.

Device variable classification:	EMF/Voltage	83 (0x53)
Device family:	Not used	250 (0xFA)
Device variable unit:	mV, V	36, 58 (0x24, 0x3A)
Device variable lower limit:	-5000 mV	
Device variable upper limit:	25000 mV	
Device variable damping possible:	Yes	

5.2.7. Conductivity sensor values (conductive)

Temperature

This value returns the damped temperature measured by the electrode.

Device variable classification:	Temperature	64 (0x40)
Device family:	Not used	250 (0xFA)
Device variable units:	°C, °F, K	32, 33, 35 (0x20, 0x21, 0x23)
Device variable lower limit:	-100 °C	
Device variable upper limit:	500 °C	
Device variable damping possible:	Yes	

Conductivity

This value returns the damped conductivity measured by the electrode.

Device variable classification:	Conductance	87 (0x57)
Device family:	Not used	250 (0xFA)
Device variable units:	mS/cm, µS/cm	66, 67 (0x42, 0x43)
Device variable lower limit:	0 mS/cm	
Device variable upper limit:	5000 mS/cm	
Device variable damping possible:	Yes	

Resistance

This value returns the damped resistivity measured by the electrode.

Device variable classification:	None	0 (0x00)
Device family:	Not used	250 (0xFA)
Device variable unit:	MΩcm	242 (0xF2)
Device variable lower limit:	0 MΩcm	
Device variable upper limit:	400000 MΩcm	
Device variable damping possible:	Yes	

TDS (mg/l)

This value returns the damped TDS (total dissolved solids) value.

Device variable classification:	Mass per volume	73 (0x49)
Device family:	Not used	250 (0xFA)
Device variable units:	µg/l, mg/l	146, 170 (0x92, 0xAA)
	g/ml, kg/l, g/l	95, 96, 97 (0x5F, 0x60, 0x61)
Device variable lower limit:	-1e7 µg/l	
Device variable upper limit:	2e9 µg/l	
Device variable damping possible:	Yes	

TDS (ppm)

This value returns the damped TDS (total dissolved solids) value.

Device variable classification:	Concentration	90 (0x5A)
Device family:	Not used	250 (0xFA)
Device variable units:	ppm, ppb	139, 169 (0x8B, 0xA9)
Device variable lower limit:	-10000 ppm	
Device variable upper limit:	2000000 ppm	
Device variable damping possible:	Yes	

5.2.8. Conductivity sensor values (conductive 4-electrode and inductive)

Temperature

This value returns the damped temperature measured by the electrode.

Device variable classification:	Temperature	64 (0x40)
Device family:	Not used	250 (0xFA)
Device variable units:	°C, °F, K	32, 33, 35 (0x20, 0x21, 0x23)
Device variable lower limit:	-100 °C	
Device variable upper limit:	500 °C	
Device variable damping possible:	Yes	

Concentration

This value returns the damped concentration value.

Device variable classification:	Analytical	81 (0x51)
Device family:	Not used	250 (0xFA)
Device variable unit:	%	57 (0x39)
Device variable lower limit:	-100 %	
Device variable upper limit:	1000 %	
Device variable damping possible:	Yes	

Conductivity

This value returns the damped conductivity measured by the electrode.

Device variable classification:	Conductance	87 (0x57)
Device family:	Not used	250 (0xFA)
Device variable units:	mS/cm, µS/cm	66, 67 (0x42, 0x43)
Device variable lower limit:	0 mS/cm	
Device variable upper limit:	5000 mS/cm	
Device variable damping possible:	Yes	

TDS (mg/l)

This value returns the damped TDS (total dissolved solids) value.

Device variable classification:	Mass per volume	73 (0x49)
Device family:	Not used	250 (0xFA)
Device variable units:	µg/l, mg/l	146, 170 (0x92, 0xAA)
	g/ml, kg/l, g/l	95, 96, 97 (0x5F, 0x60, 0x61)
Device variable lower limit:	-1e7 µg/l	
Device variable upper limit:	2e9 µg/l	
Device variable damping possible:	Yes	

TDS (ppm)

This value returns the damped TDS (total dissolved solids) value.

Device variable classification:	Concentration	90 (0x5A)
Device family:	Not used	250 (0xFA)
Device variable units:	ppm, ppb	139, 169 (0x8B, 0xA9)
Device variable lower limit:	-10000 ppm	
Device variable upper limit:	2000000 ppm	
Device variable damping possible:	Yes	

5.2.9. Dissolved oxygen sensor values (amperometrical)

Temperature

This value returns the damped temperature measured by the electrode.

Device variable classification:	Temperature	64 (0x40)
Device family:	Not used	250 (0xFA)
Device variable units:	°C, °F, K	32, 33, 35 (0x20, 0x21, 0x23)
Device variable lower limit:	-100 °C	
Device variable upper limit:	500 °C	
Device variable damping possible:	Yes	

Raw value nA

This value returns the raw current measured by the electrode.

Device variable classification:	Current	84 (0x54)
Device family:	Not used	250 (0xFA)
Device variable unit:	mA	39 (0x27)
Device variable lower limit:	-1000 mA	
Device variable upper limit:	1000 mA	
Device variable damping possible:	No	

Partial pressure

This value returns the damped partial pressure value.

Device variable classification:	Pressure	65 (0x41)
Device family:	Not used	250 (0xFA)
Device variable units:	hPa, mBar	174, 8 (0xAE, 0x08)
Device variable lower limit:	0 hPa	
Device variable upper limit:	5000 hPa	
Device variable damping possible:	Yes	

Concentration liquid (mg/l)

This value returns the damped concentration value.

Device variable classification:	Mass per volume	73 (0x49)
Device family:	Not used	250 (0xFA)
Device variable units:	µg/l, mg/l	146, 170 (0x92, 0xAA)
	g/ml, kg/l, g/l,	95, 96, 97 (0x5F, 0x60, 0x61)
Device variable lower limit:	-1e7 µg/l	
Device variable upper limit:	2e9 µg/l	
Device variable damping possible:	Yes	

Concentration liquid (ppm)

This value returns the damped concentration value.

Device variable classification:	Concentration	90 (0x5A)
Device family:	Not used	250 (0xFA)
Device variable units:	ppm, ppb	139, 169 (0x8B, 0xA9)
Device variable lower limit:	-10000 ppm	
Device variable upper limit:	2000000 ppm	
Device variable damping possible:	Yes	

Concentration gaseous (%Vol)

This value returns the damped concentration value.

Device variable classification:	Volume per volume	88 (0x58)
Device family:	Not used	250 (0xFA)
Device variable units:	%Vol	149 (0x95)
Device variable lower limit:	-100 %Vol	
Device variable upper limit:	500 %Vol	
Device variable damping possible:	Yes	

Concentration gaseous (ppm)

This value returns the damped concentration value.

Device variable classification:	Concentration	90 (0x5A)
Device family:	Not used	250 (0xFA)
Device variable units:	ppm	139 (0x8B)
Device variable lower limit:	-1000000 ppm	
Device variable upper limit:	5000000 ppm	
Device variable damping possible:	Yes	

Saturation

This value returns the damped saturation value.

Device variable classification:	Analytical	81 (0x51)
Device family:	Not used	250 (0xFA)
Device variable unit:	%	57 (0x39)
Device variable lower limit:	-100 %	
Device variable upper limit:	1000 %	
Device variable damping possible:	Yes	

5.2.10. Dissolved oxygen sensor values (optical)

Temperature

This value returns the damped temperature measured by the sensor.

Device variable classification:	Temperature	64 (0x40)
Device family:	Not used	250 (0xFA)
Device variable units:	°C, °F, K	32, 33, 35 (0x20, 0x21, 0x23)
Device variable lower limit:	-100 °C	
Device variable upper limit:	500 °C	
Device variable damping possible:	Yes	

Partial pressure

This value returns the damped partial pressure value.

Device variable classification:	Pressure	65 (0x41)
Device family:	Not used	250 (0xFA)
Device variable units:	hPa, mBar	174, 8 (0xAE, 0x08)
Device variable lower limit:	0 hPa	
Device variable upper limit:	5000 hPa	
Device variable damping possible:	Yes	

Concentration liquid (mg/l)

This value returns the damped concentration value.

Device variable classification:	Mass per volume	73 (0x49)
Device family:	Not used	250 (0xFA)
Device variable units:	µg/l, mg/l g/ml, kg/l, g/l,	146, 170 (0x92, 0xAA) 95, 96, 97 (0x5F, 0x60, 0x61)
Device variable lower limit:	-1e7 µg/l	
Device variable upper limit:	2e9 µg/l	
Device variable damping possible:	Yes	

Concentration liquid (ppm)

This value returns the damped concentration value.

Device variable classification:	Concentration	90 (0x5A)
Device family:	Not used	250 (0xFA)
Device variable units:	ppm, ppb	139, 169 (0x8B, 0xA9)
Device variable lower limit:	-10000 ppm	
Device variable upper limit:	2000000 ppm	
Device variable damping possible:	Yes	

Concentration gaseous (%Vol)

This value returns the damped concentration value.

Device variable classification:	Volume per volume	88 (0x58)
Device family:	Not used	250 (0xFA)
Device variable units:	%Vol	149 (0x95)
Device variable lower limit:	-100 %Vol	
Device variable upper limit:	500 %Vol	
Device variable damping possible:	Yes	

Concentration gaseous (ppm)

This value returns the damped concentration value.

Device variable classification:	Concentration	90 (0x5A)
Device family:	Not used	250 (0xFA)
Device variable units:	ppm	139 (0x8B)
Device variable lower limit:	-1000000 ppm	
Device variable upper limit:	5000000 ppm	
Device variable damping possible:	Yes	

Saturation

This value returns the damped saturation value.

Device variable classification:	Analytical	81 (0x51)
Device family:	Not used	250 (0xFA)
Device variable unit:	%	57 (0x39)
Device variable lower limit:	-100 %	
Device variable upper limit:	1000 %	
Device variable damping possible:	Yes	

Raw value µs

This value returns the raw τ value measured by the sensor.

Device variable classification:	Time	70 (0x46)
Device family:	Not used	250 (0xFA)
Device variable unit:	s	51 (0x33)
Device variable lower limit:	0 s	
Device variable upper limit:	None (3.4e38)	
Device variable damping possible:	No	

5.2.11. Disinfection sensor values

Temperature

This value returns the damped temperature measured by the electrode.

Device variable classification:	Temperature	64 (0x40)
Device family:	Not used	250 (0xFA)
Device variable units:	°C, °F, K	32, 33, 35 (0x20, 0x21, 0x23)
Device variable lower limit:	-100 °C	
Device variable upper limit:	500 °C	
Device variable damping possible:	Yes	

Current

This value returns the raw current measured by the electrode.

Device variable classification:	Current	84 (0x54)
Device family:	Not used	250 (0xFA)
Device variable unit:	mA	39 (0x27)
Device variable lower limit:	-1000 mA	
Device variable upper limit:	1000 mA	
Device variable damping possible:	No	

Concentration (mg/l)

This value returns the damped concentration value.

Device variable classification:	Mass per volume	73 (0x49)
Device family:	Not used	250 (0xFA)
Device variable units:	µg/l, mg/l	146, 170 (0x92, 0xAA)
	g/ml, kg/l, g/l	95, 96, 97 (0x5F, 0x60, 0x61)
Device variable lower limit:	-1e7 µg/l	
Device variable upper limit:	2e9 µg/l	
Device variable damping possible:	Yes	

Concentration (ppm)

This value returns the damped concentration value.

Device variable classification:	Concentration	90 (0x5A)
Device family:	Not used	250 (0xFA)
Device variable units:	ppm, ppb	139, 169 (0x8B, 0xA9)
Device variable lower limit:	-10000 ppm	
Device variable upper limit:	2000000 ppm	
Device variable damping possible:	Yes	

5.2.12. Turbidity sensor values

The validity of measurement values depends on operating mode and sensor type.

Temperature

This value returns the damped temperature measured by the sensor.

Device variable classification:	Temperature	64 (0x40)
Device family:	Not used	250 (0xFA)
Device variable units:	°C, °F, K	32, 33, 35 (0x20, 0x21, 0x23)
Device variable lower limit:	-100 °C	
Device variable upper limit:	500 °C	
Device variable damping possible:	Yes	

Turbidity FNU

This value returns the turbidity measured by the sensor. It is returned in NTU always, even if the device displays FNU.

Device variable classification:	None	0 (0x00)
Device family:	Not used	250 (0xFA)
Device variable unit:	NTU	241 (0xF1)
Device variable lower limit:	0 NTU	
Device variable upper limit:	20000 NTU	
Device variable damping possible:	Yes	

Turbidity (g/l)

This value returns the turbidity measured by the sensor.

Device variable classification:	Mass per volume	73 (0x49)
Device family:	Not used	250 (0xFA)
Device variable units:	µg/l, mg/l	146, 170 (0x92, 0xAA)
	g/ml, kg/l, g/l	95, 96, 97 (0x5F, 0x60, 0x61)
Device variable lower limit:	-1e7 µg/l	
Device variable upper limit:	2e9 µg/l	
Device variable damping possible:	Yes	

Turbidity (ppm)

This value returns the turbidity measured by the sensor.

Device variable classification:	Concentration	90 (0x5A)
Device family:	Not used	250 (0xFA)
Device variable units:	ppm, ppb	139, 169 (0x8B, 0xA9)
Device variable lower limit:	-10000 ppm	
Device variable upper limit:	2000000 ppm	
Device variable damping possible:	Yes	

Turbidity (%TS)

This value returns the turbidity measured by the sensor.

Device variable classification:	Analytical	81 (0x51)
Device family:	Not used	250 (0xFA)
Device variable unit:	%	57 (0x39)
Device variable lower limit:	-1 %	
Device variable upper limit:	200 %	
Device variable damping possible:	Yes	

5.2.13. Nitrate sensor values

Temperature

This value returns the damped temperature measured by the electrode.

Device variable classification:	Temperature	64 (0x40)
Device family:	Not used	250 (0xFA)
Device variable units:	°C, °F, K	32, 33, 35 (0x20, 0x21, 0x23)
Device variable lower limit:	-100 °C	
Device variable upper limit:	500 °C	
Device variable damping possible:	Yes	

NO3 (mg/l)

This value returns the damped NO3 (nitrate) value.

Device variable classification:	Mass per volume	73 (0x49)
Device family:	Not used	250 (0xFA)
Device variable units:	µg/l, mg/l	146, 170 (0x92, 0xAA)
	g/ml, kg/l, g/l	95, 96, 97 (0x5F, 0x60, 0x61)
Device variable lower limit:	-1e7 µg/l	
Device variable upper limit:	2e9 µg/l	
Device variable damping possible:	Yes	

NO3-N (mg/l)

This value returns the damped NO3-N (nitrogen portion of NO3 only) value.

Device variable classification:	Mass per volume	73 (0x49)
Device family:	Not used	250 (0xFA)
Device variable units:	µg/l, mg/l	146, 170 (0x92, 0xAA)
	g/ml, kg/l, g/l	95, 96, 97 (0x5F, 0x60, 0x61)
Device variable lower limit:	-1e7 µg/l	
Device variable upper limit:	2e9 µg/l	
Device variable damping possible:	Yes	

NO3 (ppm)

This value returns the damped NO3-N (nitrogen portion of NO3 only) value.

Device variable classification:	Concentration	90 (0x5A)
Device family:	Not used	250 (0xFA)
Device variable units:	ppm, ppb	139, 169 (0x8B, 0xA9)
Device variable lower limit:	-10000 ppm	
Device variable upper limit:	2000000 ppm	
Device variable damping possible:	Yes	

NO3-N (ppm)

This value returns the damped NO3-N (nitrogen portion of NO3 only) value.

Device variable classification:	Concentration	90 (0x5A)
Device family:	Not used	250 (0xFA)
Device variable units:	ppm, ppb	139, 169 (0x8B, 0xA9)
Device variable lower limit:	-10000 ppm	
Device variable upper limit:	2000000 ppm	
Device variable damping possible:	Yes	

5.2.14. SAC sensor values

Temperature

This value returns the damped temperature measured by the sensor.

Device variable classification:	Temperature	64 (0x40)
Device family:	Not used	250 (0xFA)
Device variable units:	°C, °F, K	32, 33, 35 (0x20, 0x21, 0x23)
Device variable lower limit:	-100 °C	
Device variable upper limit:	500 °C	
Device variable damping possible:	Yes	

SAC

This value returns the damped SAC (spectral absorption coefficient) value.

Device variable classification:	None	0 (0x00)
Device family:	Not used	250 (0xFA)
Device variable units:	1/m	243 (0xF3)
Device variable lower limit:	0 1/m	
Device variable upper limit:	5000 1/m	
Device variable damping possible:	Yes	

Transmission

This value returns the damped transmission value.

Device variable classification:	Analytical	81 (0x51)
Device family:	Not used	250 (0xFA)
Device variable unit:	%	57 (0x39)
Device variable lower limit:	-100 %	
Device variable upper limit:	1000 %	
Device variable damping possible:	Yes	

Absorption

This value returns the damped absorption value.

Device variable classification:	None	0 (0x00)
Device family:	Not used	250 (0xFA)
Device variable unit:	None	251 (0xFB)
Device variable lower limit:	None (-3.4e38)	
Device variable upper limit:	None (3.4e38)	
Device variable damping possible:	Yes	

COD (mg/l)

This value returns the COD (chemical oxygen demand) value measured by the sensor.

Device variable classification:	Mass per volume	73 (0x49)
Device family:	Not used	250 (0xFA)
Device variable units:	µg/l, mg/l	146, 170 (0x92, 0xAA)
	g/ml, kg/l, g/l	95, 96, 97 (0x5F, 0x60, 0x61)
Device variable lower limit:	-1e7 µg/l	
Device variable upper limit:	2e9 µg/l	
Device variable damping possible:	Yes	

COD (ppm)

This value returns the COD (chemical oxygen demand) value measured by the sensor.

Device variable classification:	Concentration	90 (0x5A)
Device family:	Not used	250 (0xFA)
Device variable units:	ppm, ppb	139, 169 (0x8B, 0xA9)
Device variable lower limit:	-10000 ppm	
Device variable upper limit:	2000000 ppm	
Device variable damping possible:	Yes	

TOC (mg/l)

This value returns the TOC (total organic carbon) value measured by the sensor.

Device variable classification:	Mass per volume	73 (0x49)
Device family:	Not used	250 (0xFA)
Device variable units:	µg/l, mg/l	146, 170 (0x92, 0xAA)
	g/ml, kg/l, g/l	95, 96, 97 (0x5F, 0x60, 0x61)
Device variable lower limit:	-1e7 µg/l	
Device variable upper limit:	2e9 µg/l	
Device variable damping possible:	Yes	

TOC (ppm)

This value returns the TOC (total organic carbon) value measured by the sensor.

Device variable classification:	Concentration	90 (0x5A)
Device family:	Not used	250 (0xFA)
Device variable units:	ppm, ppb	139, 169 (0x8B, 0xA9)
Device variable lower limit:	-10000 ppm	
Device variable upper limit:	2000000 ppm	
Device variable damping possible:	Yes	

DOC (mg/l)

This value returns the DOC (dissolved organic carbon) value measured by the sensor.

Device variable classification:	Mass per volume	73 (0x49)
Device family:	Not used	250 (0xFA)
Device variable units:	µg/l, mg/l	146, 170 (0x92, 0xAA)
	g/ml, kg/l, g/l	95, 96, 97 (0x5F, 0x60, 0x61)
Device variable lower limit:	-1e7 µg/l	
Device variable upper limit:	2e9 µg/l	
Device variable damping possible:	Yes	

DOC (ppm)

This value returns the DOC (dissolved organic carbon) value measured by the sensor.

Device variable classification:	Concentration	90 (0x5A)
Device family:	Not used	250 (0xFA)
Device variable units:	ppm, ppb	139, 169 (0x8B, 0xA9)
Device variable lower limit:	-10000 ppm	
Device variable upper limit:	2000000 ppm	
Device variable damping possible:	Yes	

BOD (mg/l)

This value returns the BOD (biochemical oxygen demand) value measured by the sensor.

Device variable classification:	Mass per volume	73 (0x49)
Device family:	Not used	250 (0xFA)
Device variable units:	µg/l, mg/l	146, 170 (0x92, 0xAA)
	g/ml, kg/l, g/l	95, 96, 97 (0x5F, 0x60, 0x61)
Device variable lower limit:	-1e7 µg/l	
Device variable upper limit:	2e9 µg/l	
Device variable damping possible:	Yes	

BOD (ppm)

This value returns the BOD (biochemical oxygen demand) value measured by the sensor.

Device variable classification:	Concentration	90 (0x5A)
Device family:	Not used	250 (0xFA)
Device variable units:	ppm, ppb	139, 169 (0x8B, 0xA9)
Device variable lower limit:	-10000 ppm	
Device variable upper limit:	2000000 ppm	
Device variable damping possible:	Yes	

Transmission 10mm

This value returns the transmission value normalized to 10mm path length.

Device variable classification:	Analytical	81 (0x51)
Device family:	Not used	250 (0xFA)
Device variable unit:	%	57 (0x39)
Device variable lower limit:	-100 %	
Device variable upper limit:	1000 %	
Device variable damping possible:	No	

5.2.15. Ultrasonic interface sensor values

Interface

This value returns the interface level measured by the sensor.

Device variable classification:	Length	69 (0x45)
Device family:	Not used	250 (0xFA)
Device variable units:	m, ft, in	45, 44, 47 (0x2D, 0x2C, 0x2F)
	cm, mm	48, 49 (0x30, 0x31)
Device variable lower limit:	0 m	
Device variable upper limit:	2e6 m	
Device variable damping possible:	No	

Turbidity FNU

This value returns the turbidity measured by the sensor. It is returned in NTU always, even if the device displays FNU.
This value is not present on certain sensor versions.

Device variable classification:	None	0 (0x00)
Device family:	Not used	250 (0xFA)
Device variable unit:	NTU	241 (0xF1)
Device variable lower limit:	0 NTU	
Device variable upper limit:	20000 NTU	
Device variable damping possible:	No	

5.2.16. Inline photometer values

The validity of measurement values depends on operating mode and sensor type.

Measurement value, 2nd measurement value, Reference value, Raw measurement value, Raw 2nd measurement value, Raw reference value

These values return the photometer measurement and their according raw values. They can be calibrated in units the user can define himself. As he can define any unit it's most likely there is no HART unit code for it. To avoid undefined behavior the HART unit is "unknown", always.

Device variable classification:	None	0 (0x00)
Device family:	Not used	250 (0xFA)
Device variable unit:	Unknown	252 (0xFC)
Device variable lower limit:	None (-3.4e38)	
Device variable upper limit:	None (3.4e38)	
Device variable damping possible:	No	

Raw measurement current, 2nd measurement current, Raw reference current

These values return the raw currents measured by the photometer.

Device variable classification:	Current	84 (0x54)
Device family:	Not used	250 (0xFA)
Device variable unit:	mA	39 (0x27)
Device variable lower limit:	-1000 mA	
Device variable upper limit:	1000 mA	
Device variable damping possible:	No	

Lamp current

This value returns the photometer lamp current.

Device variable classification:	Current	84 (0x54)
Device family:	Not used	250 (0xFA)
Device variable unit:	mA	39 (0x27)
Device variable lower limit:	-1000 mA	
Device variable upper limit:	1000 mA	
Device variable damping possible:	No	

Lamp voltage

This value returns the photometer lamp voltage.

Device variable classification:	EMF/Voltage	83 (0x53)
Device family:	Not used	250 (0xFA)
Device variable unit:	mV, V	36, 58 (0x24, 0x3A)
Device variable lower limit:	-5000 mV	
Device variable upper limit:	25000 mV	
Device variable damping possible:	No	

5.2.17. Spectrometer values

The validity of measurement values depends on operating mode and sensor type.

Temperature

This value returns the damped temperature measured by the sensor.

Device variable classification:	Temperature	64 (0x40)
Device family:	Not used	250 (0xFA)
Device variable units:	°C, °F, K	32, 33, 35 (0x20, 0x21, 0x23)
Device variable lower limit:	-100 °C	
Device variable upper limit:	500 °C	
Device variable damping possible:	Yes	

Measurement values (user defined name)

These values return the spectrometer measurement values. They can be calibrated in units the user can define himself. As he can define any unit it's most likely there is no HART unit code for it. To avoid undefined behavior the HART unit is "unknown", always.

Device variable classification:	None	0 (0x00)
Device family:	Not used	250 (0xFA)
Device variable unit:	Unknown	252 (0xFC)
Device variable lower limit:	None (-3.4e38)	
Device variable upper limit:	None (3.4e38)	
Device variable damping possible:	No	

5.2.18. Analyzer values

The validity of measurement values and uits depends on operating mode and analyzer type.

Analyzer value (mg/l)

This value returns the damped analyzer value (e.g. Ammonium NH4-N).

Device variable classification:	Mass per volume	73 (0x49)
Device family:	Not used	250 (0xFA)
Device variable units:	µg/l, mg/l	146, 170 (0x92, 0xAA)
	g/ml, kg/l, g/l	95, 96, 97 (0x5F, 0x60, 0x61)
Device variable lower limit:	-1e7 µg/l	
Device variable upper limit:	2e9 µg/l	
Device variable damping possible:	Yes	

Analyzer value (ppm)

This value returns the damped analyzer value (e.g. Ammonium NH4-N).

Device variable classification:	Concentration	90 (0x5A)
Device family:	Not used	250 (0xFA)
Device variable units:	ppm, ppb	139, 169 (0x8B, 0xA9)
Device variable lower limit:	-10000 ppm	
Device variable upper limit:	2000000 ppm	
Device variable damping possible:	Yes	

5.2.19. Current input values

Current

This value returns the current measured by the current input.

Device variable classification:	Current	84 (0x54)
Device family:	Not used	250 (0xFA)
Device variable unit:	mA	39 (0x27)
Device variable lower limit:	None (-3.4e38)	
Device variable upper limit:	None (3.4e38)	
Device variable damping possible:	No	

Flow rate

This value returns the flow rate measured by an external flow meter connected to a current input.

Device variable classification:	Volumetric flow	66 (0x42)
Device family:	Not used	250 (0xFA)
Device variable units:	m^3/s, (cu ft)/min, gal/min	28, 15, 16 (0x1C, 0x0F, 0x10)
	l/min, m^3/h, gal/s	17, 19, 22 (0x11, 0x13, 0x16)
	l/s, (cu ft)/s, (cu ft)/d	24, 26, 27 (0x18, 0x1A, 0x1B)
	m^3/d, (cu ft)/h, m^3/min	29, 130, 131 (0x1D, 0x82, 0x83)
	gal/h, l/h, gal/d	136, 138, 235 (0x88, 0x8A, 0xEB)
Device variable lower limit:	-5 m^3/s	
Device variable upper limit:	2000000 m^3/s	
Device variable damping possible:	No	

Totalized flow

This value returns the totalized flow calculated by the flow rate measured by an external flow meter connected to a current input.

Device variable classification:	Volume	68 (0x44)
Device family:	Not used	250 (0xFA)
Device variable units:	l, m^3, gal	41, 43, 40 (0x29, 0x2B, 0x28)
	cu ft	112 (0x70)
Device variable lower limit:	0 m^3	
Device variable upper limit:	2e10 m^3	
Device variable damping possible:	No	

Parameter

This value returns a user defined parameter represented by a current input. As the user can define any unit it's most likely there is no HART unit code for it. To avoid undefined behavior the HART unit is "unknown", always.

Device variable classification:	None	0 (0x00)
Device family:	Not used	250 (0xFA)
Device variable unit:	Unknown	252 (0xFC)
Device variable lower limit:	None (-3.4e38)	
Device variable upper limit:	None (-3.4e38)	
Device variable damping possible:	No	

5.2.20. Binary input values

Totalized flow

This value returns the totalized flow calculated by the flow rate measured by an external flow meter connected to a binary input.

Device variable classification:	Volume	68 (0x44)
Device family:	Not used	250 (0xFA)
Device variable units:	l, m^3, gal	41, 43, 40 (0x29, 0x2B, 0x28)
	cu ft	112 (0x70)
Device variable lower limit:	0 m^3	
Device variable upper limit:	2e10 m^3	
Device variable damping possible:	No	

Level

This value returns the logic level (either 0 or 1) on a binary input.

Device variable classification:	None	0 (0x00)
Device family:	Not used	250 (0xFA)
Device variable unit:	None	251 (0xFB)
Device variable lower limit:	0	
Device variable upper limit:	1	
Device variable damping possible:	No	

Edge counts

This value returns the overall level changes of the corresponding binary input.

Device variable classification:	None	0 (0x00)
Device family:	Not used	250 (0xFA)
Device variable unit:	None	251 (0xFB)
Device variable lower limit:	None (-3.4e38)	
Device variable upper limit:	None (-3.4e38)	
Device variable damping possible:	No	

Rainfall per time

This value returns the rainfall per time measured by a sensor connected to a binary input. The default unit mm/min is not mapped to HART unit codes.

Device variable classification:	None	0 (0x00)
Device family:	Not used	250 (0xFA)
Device variable unit:	None	251 (0xFB)
Device variable lower limit:	0	
Device variable upper limit:	6000000	
Device variable damping possible:	No	

Totalized rainfall

This value returns the totalized rainfall calculated by the rainfall per time measured by an external sensor connected to a binary input.

Device variable classification:	Length	69 (0x45)
Device family:	Not used	250 (0xFA)
Device variable units:	m, ft, in	45, 44, 47 (0x2D, 0x2C, 0x2F)
	cm, mm	48, 49 (0x30, 0x31)
Device variable lower limit:	0 m	
Device variable upper limit:	2e6 m	
Device variable damping possible:	No	

5.2.21. Mathematical function values

Difference

This value returns a difference calculated from 2 other measurement values.

Device variable classification:	Depends on source value	
Device family:	Not used	250 (0xFA)
Device variable unit:	Depends on source value	
Device variable lower limit:	None (-3.4e38)	
Device variable upper limit:	None (3.4e38)	
Device variable damping possible:	No	

Redundancy

This value returns a redundant value calculated from 2 other measurement values.

Device variable classification:	Depends on source value	
Device family:	Not used	250 (0xFA)
Device variable unit:	Depends on source value	
Device variable lower limit:	None (-3.4e38)	
Device variable upper limit:	None (3.4e38)	
Device variable damping possible:	No	

rH calculation

This value returns the rH value calculated from a pH and mV value.

Device variable classification:	None	0 (0x00)
Device family:	Not used	250 (0xFA)
Device variable unit:	rH	247 (0xF7)
Device variable lower limit:	None (-3.4e38)	
Device variable upper limit:	None (-3.4e38)	
Device variable damping possible:	No	

Degassed conductivity

This value returns the CO2 concentration (degassed conductivity).

Device variable classification:	Mass per volume	73 (0x49)
Device family:	Not used	250 (0xFA)
Device variable units:	µg/l, mg/l	146, 170 (0x92, 0xAA)
	g/ml, kg/l, g/l	95, 96, 97 (0x5F, 0x60, 0x61)
Device variable lower limit:	None (-3.4e38)	
Device variable upper limit:	None (-3.4e38)	
Device variable damping possible:	No	

Dual conductivity

This value returns the difference calculated from 2 conductivity values.

Device variable classification:	Conductance	87 (0x57)
Device family:	Not used	250 (0xFA)
Device variable units:	mS/cm, µS/cm	66, 67 (0x42, 0x43)
Device variable lower limit:	None (-3.4e38)	
Device variable upper limit:	None (-3.4e38)	
Device variable damping possible:	No	

Calculated pH

This value returns the pH value calculated from 2 conductivity values.

Device variable classification:	Analytical	81 (0x51)
Device family:	Not used	250 (0xFA)
Device variable unit:	pH	59 (0x3B)
Device variable lower limit:	None (-3.4e38)	
Device variable upper limit:	None (-3.4e38)	
Device variable damping possible:	No	

Cation exchanger capacity, remaining operation time

This value returns the remaining operation time of a cation exchanger.

Device variable classification:	Time	70 (0x46)
Device family:	Not used	250 (0xFA)
Device variable unit:	s	51 (0x33)
Device variable lower limit:	None (-3.4e38)	
Device variable upper limit:	None (3.4e38)	
Device variable damping possible:	No	

Cation exchanger capacity, remaining capacity

This value returns the remaining capacity of a cation exchanger.

Device variable classification:	Analytical	81 (0x51)
Device family:	Not used	250 (0xFA)
Device variable unit:	%	57 (0x39)
Device variable lower limit:	None (-3.4e38)	
Device variable upper limit:	None (3.4e38)	
Device variable damping possible:	No	

Cation exchanger capacity, time until warning limit reached

This value returns the remaining operation time of a cation exchanger.

Device variable classification:	Time	70 (0x46)
Device family:	Not used	250 (0xFA)
Device variable unit:	s	51 (0x33)
Device variable lower limit:	None (-3.4e38)	
Device variable upper limit:	None (3.4e38)	
Device variable damping possible:	No	

Formula, result numeric

This value returns the result of a user defined formula with different inputs. As the user can define any unit it's most likely there is no HART unit code for it. To avoid undefined behavior the HART unit is "unknown", always.

Device variable classification:	None	0 (0x00)
Device family:	Not used	250 (0xFA)
Device variable unit:	Unknown	252 (0xFC)
Device variable lower limit:	None (-3.4e38)	
Device variable upper limit:	None (-3.4e38)	
Device variable damping possible:	No	

5.2.22. Controller values

Bipolar

This value returns the manipulated variable y.

Device variable classification:	None	0 (0x00)
Device family:	Not used	250 (0xFA)
Device variable unit:	None	251 (0xFB)
Device variable lower limit:	-1	
Device variable upper limit:	1	
Device variable damping possible:	No	

Unipolar +

This value returns the manipulated variable y.

Device variable classification:	None	0 (0x00)
Device family:	Not used	250 (0xFA)
Device variable unit:	None	251 (0xFB)
Device variable lower limit:	0	
Device variable upper limit:	1	
Device variable damping possible:	No	

Unipolar -

This value returns the manipulated variable y.

Device variable classification:	None	0 (0x00)
Device family:	Not used	250 (0xFA)
Device variable unit:	None	251 (0xFB)
Device variable lower limit:	0	
Device variable upper limit:	1	
Device variable damping possible:	No	

5.2.23. Heartbeat values

Heartbeat transmitter, status

This value returns the transmitter heartbeat status.

Device variable classification:	Analytical	81 (0x51)
Device family:	Not used	250 (0xFA)
Device variable unit:	%	57 (0x39)
Device variable lower limit:	-100 %	
Device variable upper limit:	1000 %	
Device variable damping possible:	No	

Heartbeat transmitter, device health

This value returns the transmitter device health.

Device variable classification:	Analytical	81 (0x51)
Device family:	Not used	250 (0xFA)
Device variable unit:	%	57 (0x39)
Device variable lower limit:	-100 %	
Device variable upper limit:	1000 %	
Device variable damping possible:	No	

Heartbeat sensor, status

This value returns the status of a sensor.

Device variable classification:	Analytical	81 (0x51)
Device family:	Not used	250 (0xFA)
Device variable unit:	%	57 (0x39)
Device variable lower limit:	-100 %	
Device variable upper limit:	1000 %	
Device variable damping possible:	No	

Heartbeat sensor, health

This value returns the health of a sensor.

Device variable classification:	Analytical	81 (0x51)
Device family:	Not used	250 (0xFA)
Device variable unit:	%	57 (0x39)
Device variable lower limit:	-100 %	
Device variable upper limit:	1000 %	
Device variable damping possible:	No	

Heartbeat sensor, maintenance timer

This value returns the remaining interval until next sensor maintenance.

Device variable classification:	Analytical	81 (0x51)
Device family:	Not used	250 (0xFA)
Device variable unit:	%	57 (0x39)
Device variable lower limit:	-100 %	
Device variable upper limit:	1000 %	
Device variable damping possible:	No	

5.3. Current outputs measurement values

All measurement values listed above can not only be mapped to a device variable, but to all current outputs, too. These mapped values can be read using the device variables 16..23.

Device variable 16 (0x10):	Value mapped to current output 1
Device variable 17 (0x11):	Value mapped to current output 2
Device variable 18 (0x12):	Value mapped to current output 3
Device variable 19 (0x13):	Value mapped to current output 4
Device variable 20 (0x14):	Value mapped to current output 5
Device variable 21 (0x15):	Value mapped to current output 6
Device variable 22 (0x16):	Value mapped to current output 7
Device variable 23 (0x17):	Value mapped to current output 8

The number of actual present current outputs depends on the Liquiline version. Not present, inactive or unassigned current outputs will lead to a NaN value being returned.

5.4. Current values

All current values of the outputs can be read using device variables 24..31.

Device variable 24 (0x18):	Current value output 1
Device variable 25 (0x19):	Current value output 2
Device variable 26 (0x1A):	Current value output 3
Device variable 27 (0x1B):	Current value output 4
Device variable 28 (0x1C):	Current value output 5
Device variable 29 (0x1D):	Current value output 6
Device variable 30 (0x1E):	Current value output 7
Device variable 31 (0x1F):	Current value output 8

Device variable numbers:	24..31	
Device variable classification:	Current	84 (0x54)
Device family:	Not used	250 (0xFA)
Device variable unit:	mA	39 (0x27)
Device variable lower limit:	0 mA	
Device variable upper limit:	23 mA	

The number of actual present current outputs depends on the Liquiline version. Not present or inactive current outputs will return 0 mA. Unassigned current outputs will return error current (e.g., 21.5 mA).

5.5. Standardized device variables

These device variables have to be present in every HART 7 device.
Standardized device variables cannot be mapped to PV, SV, TV or QV using command 51.

5.5.1. Battery life

This device variable will always return NaN, as Liquiline is not battery powered.

Device variable number:	243 (0xF3)	
Device variable classification:	None	0 (0x00)
Device family:	Not used	250 (0xFA)
Device variable unit:	Not used	250 (0xFA)
Device variable lower limit:	NaN	
Device variable upper limit:	NaN	

5.5.2. Percent range

This device variable returns the PV percentage corresponding to its user set limits. The value will always follow the PV even if the limits are exceeded, or the device is in an error state.

Device variable number:	244 (0xF4)	
Device variable classification:	Analytical	81 (0x51)
Device family:	Not used	250 (0xFA)
Device variable unit:	%	57 (0x39)
Device variable lower limit:	-1000 %	
Device variable upper limit:	1000 %	

5.5.3. Loop current

This device variable returns the loop current on current output 1 even if the device is in an error or simulation state.

Device variable number:	245 (0xF5)	
Device variable classification:	Current	84 (0x54)
Device family:	Not used	250 (0xFA)
Device variable unit:	mA	39 (0x27)
Device variable lower limit:	0 mA	
Device variable upper limit:	23 mA	

5.5.4. Primary variable

This device variable returns the primary variable (PV). As PV is always the value assigned to current output 1, device variable 246 is the same as device variable 16.

Device variable number:	246 (0xF6)	
Device variable classification:	Depends on PV settings	
Device family:	Not used	250 (0xFA)
Device variable unit:	Depends on PV settings	
Device variable lower limit:	Depends on PV settings	
Device variable upper limit:	Depends on PV settings	

5.5.5. Secondary variable

This device variable returns the secondary variable (SV).

Device variable number:	247 (0xF7)	
Device variable classification:	Depends on SV settings	
Device family:	Not used	250 (0xFA)
Device variable unit:	Depends on SV settings	
Device variable lower limit:	Depends on SV settings	
Device variable upper limit:	Depends on SV settings	

5.5.6. Tertiary variable

This device variable returns the tertiary variable (TV).

Device variable number:	248 (0xF8)	
Device variable classification:	Depends on TV settings	
Device family:	Not used	250 (0xFA)
Device variable unit:	Depends on TV settings	
Device variable lower limit:	Depends on TV settings	
Device variable upper limit:	Depends on TV settings	

5.5.7. Quaternary variable

This device variable returns the quaternary variable (QV).

Device variable number:	249 (0xF9)	
Device variable classification:	Depends on QV settings	
Device family:	Not used	250 (0xFA)
Device variable unit:	Depends on QV settings	
Device variable lower limit:	Depends on QV settings	
Device variable upper limit:	Depends on QV settings	

6. Dynamic variables

All 4 dynamic variables (primary variable PV, secondary variable SV, tertiary variable TV and quaternary variable QV) are implemented in Liquiline devices.

6.1. Fixed dynamic variables

PV is always mapped to device variable 16.

6.2. Dynamic variables with configurable mapping

SV, TV and QV can be mapped to any device variable.

Default mapping:
PV returns device variable 16 (0x10) - Value mapped to current output 1
SV returns device variable 17 (0x11) - Value mapped to current output 2
TV returns device variable 0 - User selected value
QV returns device variable 1 - User selected value

7. Status information

7.1. Device status

Bit 4 (0x10, "More status available") is set whenever a diagnostic message can be found in the diagnostics list.

Bit 7 (0x80, "Device malfunction") is set whenever an error message is present (indicated by an F icon in the upper right corner of the Liquiline display). All other diagnostics messages (M, C and S) will not set this bit.

All other bits are not used.

7.2. Extended device status

Bit 0 (0x01, "Maintenance required") is set whenever a maintenance message is present (indicated by an M icon symbol in the upper right corner of the Liquiline display). All other diagnostics messages (F, C and S) will not set this bit.

Bit 1 (0x02, "Device variable alert") is not implemented.

All other bits are not used.

7.3. Standardized status

Standardized status is not supported.

7.4. Additional device status - command #48

Command 48 will return the following bits and bytes:

Byte	Bit	Bit	Error position
0	0	0	Sensor channel 1 error
0	1	1	Sensor channel 2 error
0	2	2	Sensor channel 3 error
0	3	3	Sensor channel 4 error
0	4	4	Sensor channel 5 error
0	5	5	Sensor channel 6 error
0	6	6	Sensor channel 7 error
0	7	7	Sensor channel 8 error
1	0	8	Global error
1	1	9	Reserved
1	2	10	Reserved
1	3	11	Reserved
1	4	12	Reserved
1	5	13	Reserved
1	6	14	Reserved
1	7	15	Reserved
2	0..7	16..23	Reserved
3	0..7	24..31	Reserved
4	0..7	32..39	Reserved
5	0..7	40..47	Reserved

Byte	Bit	Bit	Meaning	According Liquiline diagnostics code(s)
14	0..7	112..119	Reserved	-
15	0	120	Reserved	-
15	1	121	Initialization or maintenance active, please wait	10, 81, 202, 403, 412, 413
15	2	122	Device failure, service necessary	241, 242, 243, 261, 263, 285, 304, 305, 306, 370, 502, 503, 978
15	3	123	Device maintenance, service necessary	162, 163, 373, 916
15	4	124	Calibration active, please wait	107
15	5	125	Battery empty, change battery of clock	302
15	6	126	Analog input out of spec. range	970, 972, 973
15	7	127	Analog output out of spec. range	460, 461, 971
16	0	128	Alarm, measurement value failure, check application	142, 144, 552, 553, 554, 555, 558, 559, 560, 561, 841, 842, 843, 906, 910, 961, 962, 963, 964, 965, 966, 967, 968
16	1	129	Warning, measurement value failure, check application	141, 168, 907, 937, 938, 939, 942, 943, 944, 945, 946
16	2	130	Alarm, temperature failure, check application	135, 136, 146, 550, 551, 556, 557, 832, 984
16	3	131	Warning, temperature failure, check application	934, 935
16	4	132	Alarm, process check system, no change of measurement value	904
16	5	133	Logbook memory, check logbook	530, 531, 536, 537, 538
16	6	134	Reserved	-
16	7	135	Reserved	-
17	0	136	Reserved	-
17	1	137	Reserved	-
17	2	138	Reserved	-
17	3	139	Reserved	-
17	4	140	Reserved	-
17	5	141	Reserved	-
17	6	142	Reserved	-
17	7	143	Reserved	-
18	0	144	Alarm, no module communication	262
18	1	145	Reserved	-
18	2	146	Sensor communication, check connection	62, 100, 110, 130, 158, 374, 985
18	3	147	Alarm, sensor failure, service necessary	2, 4, 5, 12, 13, 18, 61, 137, 138, 140, 143, 149, 150, 151, 159, 172, 175, 740, 770, 771, 774
18	4	148	Alarm, replace wear part	101, 106, 147, 148, 153, 155, 161, 173, 174, 773, 909
18	5	149	Warning, replace wear part	108, 109, 126, 157, 534, 535, 720, 734, 908
18	6	150	Alarm, clean or replace sensor	156
18	7	151	Calibration necessary	152, 154, 160, 164, 844
19	0	152	Replace temperature sensor	22
19	1	153	Alarm, calibration timer expired	103, 104
19	2	154	Warning, calibration timer expires soon	102, 105

Byte	Bit	Bit	Meaning	According Liquiline diagnostics code(s)
19	3	155	Warning, temperature calibration expires soon	114, 115, 116, 117
19	4	156	Calibration failure, repeat calibration	131, 132, 500, 501, 505, 507, 509, 511, 513, 515, 517, 518, 520, 522
19	5	157	Warning, operation time	111, 169, 170, 171, 176, 177, 178, 179, 180, 181, 182, 183, 184, 185, 186, 187, 188, 189, 190, 191, 192, 193, 194, 195, 196, 197, 198, 199, 772
19	6	158	Alarm, sensor glass membrane	118, 122, 124
19	7	159	Warning, sensor glass membrane	119, 123, 125, 127
20	0	160	Alarm, sensor reference	120, 724
20	1	161	Warning, sensor reference	121, 725
20	2	162	Alarm, sensor leak current	128
20	3	163	Warning, sensor leak current	129
20	4	164	Alarm, low sensor signal	133
20	5	165	Warning, low sensor signal	134
20	6	166	Alarm, ISE check	983, 987
20	7	167	Alarm, USP / EP	914
21	0	168	Warning, USP / EP	915
21	1	169	Calculation overflow	455, 991, 992, 993, 994
21	2	170	Redundancy deviation	990
21	3	171	Set default failed	545
21	4	172	File operation fail	540, 542, 543
21	5	173	License error	532
21	6	174	Calibration aborted	408
21	7	175	Reserved	-
22	0	176	Reserved	-
22	1	177	Diagnostics menu selected	529
22	2	178	Hold active	216, 951, 952, 953, 954, 955, 956, 957, 958
22	3	179	Reserved	-
22	4	180	Simulation active	215
22	5	181	Reserved	-
22	6	182	Reserved	-
22	7	183	Reserved	-
23	0..7	184..191	Reserved	-
24	0..7	192..199	Reserved	-

For more information about errors and the corresponding Namur classes (F, M, C, S) refer to the operating instructions.
The command 48 bits are up to date all the time.

8. Universal commands

Liqiline supports all universal commands as described in the HART specification (HCF_SPEC-127 revision 7.1).

8.1. Read unique identifier #0 (0x00)

This command reads fundamental information about the connected device.

Request data bytes

Byte	Format	Description
None		

Response data bytes

Byte	Format	Description
0	Unsigned-8	254
1..2	Unsigned-16	Expanded device type
3	Unsigned-8	Minimum request preambles
4	Unsigned-8	Universal command revision
5	Unsigned-8	Device revision
6	Unsigned-8	Software revision
7	Unsigned-8	Hardware revision / Physical signaling code
8	Unsigned-8	Flags
9..11	Unsigned-24	Device ID
12	Unsigned-8	Minimum response preambles
13	Unsigned-8	Maximum number of device variables
14..15	Unsigned-16	Configuration change counter
16	Unsigned-8	Extended field device status
17..18	Unsigned-16	Manufacturer identification code
19..20	Unsigned-16	Private label distributor code
21	Unsigned-8	Device profile

Command specific response codes

Code	Class	Description
0	Success	No command specific errors

8.2. Read primary variable #1 (0x01)

This command reads the primary variable (PV). The primary variable is selected by the source of current output 1.

Request data bytes

Byte	Format	Description
None		

Response data bytes

Byte	Format	Description
0	Unsigned-8	Primary variable unit
1..4	Float	Primary variable

Command specific response codes

Code	Class	Description
0	Success	No command specific errors

8.3. Read loop current and percent of range #2 (0x02)

This command reads the loop current and the PV percent of range of current output 1.

Request data bytes

Byte	Format	Description
None		

Response data bytes

Byte	Format	Description
0..3	Float	Loop current [mA]
4..7	Float	Percent of range [%]

Command specific response codes

Code	Class	Description
0	Success	No command specific errors

8.4. Read dynamic variables and loop current #3 (0x03)

This command reads the loop current and up to four predefined dynamic variables. Every dynamic variable corresponds to one device variable (see chapter 6). PV is always mapped to device variable 16.

Request data bytes

Byte	Format	Description
None		

Response data bytes

Byte	Format	Description
0..3	Float	Loop current [mA]
4	Unsigned-8	Primary variable unit
5..8	Float	Primary variable
9	Unsigned-8	Secondary variable unit
10..13	Float	Secondary variable
14	Unsigned-8	Tertiary variable unit
15..18	Float	Tertiary variable
19	Unsigned-8	Quaternary variable unit
20..23	Float	Quaternary variable

Command specific response codes

Code	Class	Description
0	Success	No command specific errors

8.5. Write polling address #6 (0x06)

This command writes the polling address and the loop current mode. The polling address can be set at the Liqiline operating panel as well.

Request data bytes

Byte	Format	Description
0	Unsigned-8	Polling address
1	Unsigned-8	Loop current mode (optional)

Response data bytes

Byte	Format	Description
0	Unsigned-8	Polling address
1	Unsigned-8	Loop current mode

Command specific response codes

Code	Class	Description
0	Success	No command specific errors
2	Error	Invalid address
5	Error	Too few data bytes received
6	Error	Device specific command error
12	Error	Invalid mode
16	Error	Access restricted

Loop current mode

Disabled: 0
Enabled: 1

8.6. Read loop configuration #7 (0x07)

This command reads the loop current and the polling address.

Request data bytes

Byte	Format	Description
None		

Response data bytes

Byte	Format	Description
0	Unsigned-8	Polling address
1	Unsigned-8	Loop current mode

Command specific response codes

Code	Class	Description
0	Success	No command specific errors

8.7. Read dynamic variable classification #8 (0x08)

This command reads the classification associated with the dynamic variables. By this command the correct unit code table can be determined.

Request data bytes

Byte	Format	Description
None		

Response data bytes

Byte	Format	Description
0	Unsigned-8	Primary variable classification
1	Unsigned-8	Secondary variable classification
2	Unsigned-8	Tertiary variable classification
3	Unsigned-8	Quaternary variable classification

Command specific response codes

Code	Class	Description
0	Success	No command specific errors

8.8. Read device variables with status #9 (0x09)

This command reads up to 8 device variables with their status.

Request data bytes

Byte	Format	Description
0	Unsigned-8	Slot 0: Device variable code
1	Unsigned-8	Slot 1: Device variable code (optional)
2	Unsigned-8	Slot 2: Device variable code (optional)
3	Unsigned-8	Slot 3: Device variable code (optional)
4	Unsigned-8	Slot 4: Device variable code (optional)
5	Unsigned-8	Slot 5: Device variable code (optional)
6	Unsigned-8	Slot 6: Device variable code (optional)
7	Unsigned-8	Slot 7: Device variable code (optional)

Response data bytes

Byte	Format	Description
0	Unsigned-8	Extended device status
1	Unsigned-8	Slot 0: Device variable code
2	Unsigned-8	Slot 0: Device variable classification
3	Unsigned-8	Slot 0: Device variable unit
4..7	Float	Slot 0: Device variable value
8	Unsigned-8	Slot 0: Device variable status
9	Unsigned-8	Slot 1: Device variable code
10	Unsigned-8	Slot 1: Device variable classification
11	Unsigned-8	Slot 1: Device variable unit
12..15	Float	Slot 1: Device variable value
16	Unsigned-8	Slot 1: Device variable status
17	Unsigned-8	Slot 2: Device variable code
18	Unsigned-8	Slot 2: Device variable classification
19	Unsigned-8	Slot 2: Device variable unit
20..23	Float	Slot 2: Device variable value
24	Unsigned-8	Slot 2: Device variable status
25	Unsigned-8	Slot 3: Device variable code
26	Unsigned-8	Slot 3: Device variable classification
27	Unsigned-8	Slot 3: Device variable unit
28..31	Float	Slot 3: Device variable value
32	Unsigned-8	Slot 3: Device variable status
33	Unsigned-8	Slot 4: Device variable code
34	Unsigned-8	Slot 4: Device variable classification
35	Unsigned-8	Slot 4: Device variable unit
36..39	Float	Slot 4: Device variable value
40	Unsigned-8	Slot 4: Device variable status
41	Unsigned-8	Slot 5: Device variable code
42	Unsigned-8	Slot 5: Device variable classification
43	Unsigned-8	Slot 5: Device variable unit
44..47	Float	Slot 5: Device variable value
48	Unsigned-8	Slot 5: Device variable status
49	Unsigned-8	Slot 6: Device variable code
50	Unsigned-8	Slot 6: Device variable classification
51	Unsigned-8	Slot 6: Device variable unit
52..55	Float	Slot 6: Device variable value
56	Unsigned-8	Slot 6: Device variable status

57	Unsigned-8	Slot 7: Device variable code
58	Unsigned-8	Slot 7: Device variable classification
59	Unsigned-8	Slot 7: Device variable unit
60..63	Float	Slot 7: Device variable value
64	Unsigned-8	Slot 7: Device variable status
65..68(*)	Time	Slot 0: Data time stamp

Command specific response codes

Code	Class	Description
0	Success	No command specific errors
2	Error	Invalid selection
5	Error	Too few data bytes received
16	Error	Access restricted

(*) Timestamp is always present, even if less than 8 device variables were requested. Its position is always at the end of the frame. Timestamp is in format 1/32 ms since midnight (Unsigned-32).

8.9. Read unique identifier associated with tag #11 (0x0B)

This command reads fundamental information about the connected device.
The device will not respond to this command unless the short tag matches.

Request data bytes

Byte	Format	Description
0..5	Packed ASCII	Tag

Response data bytes

Byte	Format	Description
0	Unsigned-8	254
1..2	Unsigned-16	Expanded device type
3	Unsigned-8	Minimum request preambles
4	Unsigned-8	Universal command revision
5	Unsigned-8	Device revision
6	Unsigned-8	Software revision
7	Unsigned-8	Hardware revision / Physical signaling code
8	Unsigned-8	Flags
9..11	Unsigned-24	Device ID
12	Unsigned-8	Minimum response preambles
13	Unsigned-8	Maximum number of device variables
14..15	Unsigned-16	Configuration change counter
16	Unsigned-8	Extended field device status
17..18	Unsigned-16	Manufacturer identification code
19..20	Unsigned-16	Private label distributor code
21	Unsigned-8	Device profile

Command specific response codes

Code	Class	Description
0	Success	No command specific errors
6	Error	Device specific command error

8.10. Read message #12 (0x0C)

This command reads the message.

Request data bytes

Byte	Format	Description
None		

Response data bytes

Byte	Format	Description
0..23	Packed ASCII	Message

Command specific response codes

Code	Class	Description
0	Success	No command specific errors

8.11. Read tag, descriptor and date #13 (0x0D)

This command reads the short tag, descriptor and the date.
The short HART tag is completely separated from the device tag. The short tag can be read and written via HART only.

Request data bytes

Byte	Format	Description
None		

Response data bytes

Byte	Format	Description
0..5	Packed ASCII	Short tag
6..17	Packed ASCII	Descriptor
18..20	Unsigned-24	Date

Command specific response codes

Code	Class	Description
0	Success	No command specific errors

8.12. Read primary variable transducer information #14 (0x0E)

This command reads the serial number, limits and the minimum span for the primary variable.
The serial number is always 0.

Request data bytes

Byte	Format	Description
None		

Response data bytes

Byte	Format	Description
0..2	Unsigned-24	Transducer serial number
3	Unsigned-8	Transducer limits and span unit
4..7	Float	Upper transducer limit
8..11	Float	Lower transducer limit
12..15	Float	Minimum transducer span

Command specific response codes

Code	Class	Description
0	Success	No command specific errors

8.13. Read device information #15 (0x0F)

This command reads additional information of the device.

Request data bytes

Byte	Format	Description
None		

Response data bytes

Byte	Format	Description
0	Unsigned-8	PV alarm selection code
1	Unsigned-8	PV transfer function code
2	Unsigned-8	PV range value unit
3..6	Float	PV upper range value
7..10	Float	PV lower range value
11..14	Float	PV damping value [s]
15	Unsigned-8	Write protect code
16	Unsigned-8	Reserved
17	Unsigned-8	PV analog channel flags

Command specific response codes

Code	Class	Description
0	Success	No command specific errors

8.14. Read final assembly number #16 (0x10)

This command reads the final assembly number of the device.

Request data bytes

Byte	Format	Description
None		

Response data bytes

Byte	Format	Description
0..2	Unsigned-24	Final assembly number

Command specific response codes

Code	Class	Description
0	Success	No command specific errors

8.15. Write message #17 (0x11)

This command writes the message.

Request data bytes

Byte	Format	Description
0..23	Packed ASCII	Message

Response data bytes

Byte	Format	Description
0..23	Packed ASCII	Message

Command specific response codes

Code	Class	Description
0	Success	No command specific errors
5	Error	Too few data bytes received
6	Error	Device specific command error
16	Error	Access restricted

8.16. Write tag, descriptor and date #18 (0x12)

This command writes the short tag, descriptor and the date.
The short HART tag is completely separated from the device tag. The short tag can be read and written via HART only.

Request data bytes

Byte	Format	Description
0..5	Packed ASCII	Short tag
6..17	Packed ASCII	Descriptor
18..20	Unsigned-24	Date

Response data bytes

Byte	Format	Description
0..5	Packed ASCII	Short tag
6..17	Packed ASCII	Descriptor
18..20	Unsigned-24	Date

Command specific response codes

Code	Class	Description
0	Success	No command specific errors
5	Error	Too few data bytes received
6	Error	Device specific command error
16	Error	Access restricted

8.17. Write final assembly number #19 (0x13)

This command writes the final assembly number.

Request data bytes

Byte	Format	Description
0..2	Unsigned-24	Final assembly number

Response data bytes

Byte	Format	Description
0..2	Unsigned-24	Final assembly number

Command specific response codes

Code	Class	Description
0	Success	No command specific errors
5	Error	Too few data bytes received
6	Error	Device specific command error
16	Error	Access restricted

8.18. Read long tag #20 (0x14)

This command reads the long tag.
The long HART tag corresponds to the Liquiline tag shown on the display and in the setup menu. This tag can be edited via HART and the local operating panel.

Request data bytes

Byte	Format	Description
None		

Response data bytes

Byte	Format	Description
0..31	Latin-1	Long tag

Command specific response codes

Code	Class	Description
0	Success	No command specific errors
16	Error	Access restricted

8.19. Read unique identifier associated with long tag #21 (0x15)

This command reads fundamental information about the connected device.
The device will not respond to this command unless the long tag matches.

Request data bytes

Byte	Format	Description
0..31	Latin-1	Tag

Response data bytes

Byte	Format	Description
0	Unsigned-8	254
1..2	Unsigned-16	Expanded device type
3	Unsigned-8	Minimum request preambles
4	Unsigned-8	Universal command revision
5	Unsigned-8	Device revision
6	Unsigned-8	Software revision
7	Unsigned-8	Hardware revision / Physical signaling code
8	Unsigned-8	Flags
9..11	Unsigned-24	Device ID
12	Unsigned-8	Minimum response preambles
13	Unsigned-8	Maximum number of device variables
14..15	Unsigned-16	Configuration change counter
16	Unsigned-8	Extended field device status
17..18	Unsigned-16	Manufacturer identification code
19..20	Unsigned-16	Private label distributor code
21	Unsigned-8	Device profile

Command specific response codes

Code	Class	Description
0	Success	No command specific errors

8.20. Write long tag #22 (0x16)

This command writes the long tag.
The long HART tag corresponds to the Liquiline tag shown on the display and in the setup menu. This tag can be edited via HART and the local operating panel.

Request data bytes

Byte	Format	Description
0..31	Latin-1	Long tag

Response data bytes

Byte	Format	Description
0..31	Latin-1	Long tag

Command specific response codes

Code	Class	Description
0	Success	No command specific errors
5	Error	Too few data bytes received
6	Error	Device specific command error
16	Error	Access restricted

8.21. Reset configuration changed flag #38 (0x26)

This command will reset one of the configuration changed flags, depending on the sending master.
If the configuration change counter value is sent the device will check it versus the current counter value. If both match the configuration changed flag will be reset.

Request data bytes

Byte	Format	Description
0..1	Unsigned-16	Configuration change counter (optional)

Response data bytes

Byte	Format	Description
0..1	Unsigned-16	Configuration change counter

Command specific response codes

Code	Class	Description
0	Success	No command specific errors
6	Error	Device specific command error
9	Error	Configuration change counter mismatch
16	Error	Access restricted

8.22. Read additional status #48 (0x30)

This command returns device status information not included in the response code or device status byte.
A description of every single bits meanings can be found in chapter 7.4
If data is included when sending command 48 data is checked versus the current device status. If all data matches the “more status available” flag is reset.

Request data bytes

Byte	Format	Description
0..5	Bits	See chapter 7.4 (optional)
6	Bits	Extended device status (optional)
7	Bits	Device operating mode (optional)
8	Bits	Standardized status 0 (optional)
9	Bits	Standardized status 1 (optional)
10	Bits	Analog channel saturated (optional)
11	Bits	Standardized status 2 (optional)
12	Bits	Standardized status 3 (optional)
13	Bits	Analog channel fixed (optional)
14..24	Bits	See chapter 7.4 (optional)

Response data bytes

Byte	Format	Description
0..5	Bits	See chapter 7.4
6	Bits	Extended device status
7	Bits	Device operating mode
8	Bits	Standardized status 0
9	Bits	Standardized status 1
10	Bits	Analog channel saturated
11	Bits	Standardized status 2
12	Bits	Standardized status 3
13	Bits	Analog channel fixed
14..24	Bits	See chapter 7.4

Command specific response codes

Code	Class	Description
0	Success	No command specific errors

9. Common practice commands

The following chapters show all common practice commands supported by Liquiline.

9.1. Read device variable #33 (0x21)

This command reads up to four device variables.

Request data bytes

Byte	Format	Description
0	Unsigned-8	Slot 0: Device variable code
1	Unsigned-8	Slot 1: Device variable code (optional)
2	Unsigned-8	Slot 2: Device variable code (optional)
3	Unsigned-8	Slot 3: Device variable code (optional)

Response data bytes

Byte	Format	Description
0	Unsigned-8	Slot 0: Device variable code
1	Unsigned-8	Slot 0: Device variable unit
2..5	Float	Slot 0: Device variable value
6	Unsigned-8	Slot 1: Device variable code
7	Unsigned-8	Slot 1: Device variable unit
8..11	Float	Slot 1: Device variable value
12	Unsigned-8	Slot 2: Device variable code
13	Unsigned-8	Slot 2: Device variable unit
14..17	Float	Slot 2: Device variable value
18	Unsigned-8	Slot 3: Device variable code
19	Unsigned-8	Slot 3: Device variable unit
20..23	Float	Slot 3: Device variable value

Command specific response codes

Code	Class	Description
0	Success	No command specific errors
2	Error	Invalid selection
5	Error	Too few data bytes received
6	Error	Device specific command error

9.2. Write primary variable damping value #34 (0x22)

This command writes the primary variable damping value.
This value can also be set using the Liquiline operating panel.
The damping value can be set only for certain measurement values. Please refer to chapter5.2.

Request data bytes

Byte	Format	Description
0..3	Float	Primary variable damping value [s]

Response data bytes

Byte	Format	Description
0..3	Float	Primary variable damping value [s]

Command specific response codes

Code	Class	Description
0	Success	No command specific errors
3	Error	Passed parameter too large
4	Error	Passed parameter too small
5	Error	Too few data bytes received
8	Warning	Set to nearest possible value
16	Error	Access restricted

9.3. Write primary variable range values #35 (0x23)

This command defines the relationship between the loop current and the primary variable.
These values can also be set using the Liquiline operating panel.
The upper limit can be set below the lower limit. The current output will operate in reverse direction then.

Request data bytes

Byte	Format	Description
0	Unsigned-8	Range value unit
1..4	Float	Upper range value (value at 20mA)
5..8	Float	Lower range value (value at 4mA)

Response data bytes

Byte	Format	Description
0	Unsigned-8	Range value unit
1..4	Float	Upper range value (value at 20mA)
5..8	Float	Lower range value (value at 4mA)

Command specific response codes

Code	Class	Description
0	Success	No command specific errors
5	Error	Too few data bytes received
6	Error	Device specific command error
9	Error	Lower range value too high
10	Error	Lower range value too low
11	Error	Upper range value too high
12	Error	Upper range value too low
13	Error	Upper and lower range value out of limits
14	Warning	Span too small
16	Error	Access restricted
18	Error	Invalid units code
29	Error	Invalid span

9.4. Set primary variable upper range value #36 (0x24)

As soon as this command is issued, the present primary variable value is copied into the upper range value.
The upper range can be set below the lower range.
Use this command in combination with command 37 to adjust the PV range.

Request data bytes

Byte	Format	Description
None		

Response data bytes

Byte	Format	Description
None		

Command specific response codes

Code	Class	Description
0	Success	No command specific errors
6	Error	Device specific command error
9	Error	Applied process too high
10	Error	Applied process too low
14	Warning	Span too small
16	Error	Access restricted
29	Error	Invalid span

9.5. Set primary variable lower range value #37 (0x25)

As soon as this command is issued, the present primary variable value is copied into the lower range value.
At the same time, the upper range will be shifted to keep the span constant.
Use this command in combination with command 36 to adjust the PV range.

Request data bytes

Byte	Format	Description
None		

Response data bytes

Byte	Format	Description
None		

Command specific response codes

Code	Class	Description
0	Success	No command specific errors
6	Error	Device specific command error
9	Error	Applied process too high
10	Error	Applied process too low
14	Warning	Span too small
16	Error	Access restricted
29	Error	Invalid span

9.6. Enter/Exit fixed current mode #40 (0x28)

This command sets a certain fixed current on current output 1 (current simulation).
To disable simulation mode a value of 0.0 has to be set.
The simulation mode and the current value can also be set using the Liqiline local operating panel. The simulation mode is cancelled at power loss/reset.
Simulation values in the range from 2.4 to 23 mA are valid.

Request data bytes

Byte	Format	Description
0..3	Float	Fixed current value [mA]

Response data bytes

Byte	Format	Description
0..3	Float	Fixed current value [mA]

Command specific response codes

Code	Class	Description
0	Success	No command specific errors
3	Error	Passed parameter too large
4	Error	Passed parameter too small
5	Error	Too few data bytes received
6	Error	Device specific command error
11	Error	Loop current not active (multidrop mode)
16	Error	Access restricted

9.7. Perform self test #41 (0x29)

This command answers the request, only. It is implemented for compatibility reasons.
Issuing command 48 (read additional status) will return up to date data at every time.

Request data bytes

Byte	Format	Description
None		

Response data bytes

Byte	Format	Description
None		

Command specific response codes

Code	Class	Description
0	Success	No command specific errors

9.8. Perform device reset #42 (0x2A)

This command triggers a device reset. Liquiline can take up to 2 minutes to initialize and be back online.

Request data bytes

Byte	Format	Description
None		

Response data bytes

Byte	Format	Description
None		

Command specific response codes

Code	Class	Description
0	Success	No command specific errors
16	Error	Access restricted

9.9. Write primary variable unit #44 (0x2C)

This command selects the unit in which the primary variable and its range will be returned. Possible units depending on different operating modes are listed in chapter 5.2.

Request data bytes

Byte	Format	Description
0	Unsigned-8	Primary variable unit

Response data bytes

Byte	Format	Description
0	Unsigned-8	Primary variable unit

Command specific response codes

Code	Class	Description
0	Success	No command specific errors
2	Error	Invalid selection
5	Error	Too few data bytes received
16	Error	Access restricted

9.10. Trim loop current zero #45 (0x2D)

Command 45 and 46 can do a recalibration of the current output 1 loop.
These commands will not destroy the factory current output calibration, but do a second user calibration.
To restore the original values execute a "Factory default" in the Liquiline diagnostics menu or send a command 45 with value 0.0 mA.

Command 45 recalibrates the lower range of the current output.

Before sending command 45 command 40 with a value of 4 mA has to be sent.
The value to be sent with command 45 must be measured with an external ampere meter.

Request data bytes

Byte	Format	Description
0..3	Float	Externally measured loop current [mA]

Response data bytes

Byte	Format	Description
0..3	Float	Loop current [mA]

Command specific response codes

Code	Class	Description
0	Success	No command specific errors
3	Error	Passed parameter too large
4	Error	Passed parameter too small
5	Error	Too few data bytes received
6	Error	Device specific command error
9	Error	Incorrect loop current mode or value
11	Error	Loop current not active (multidrop mode)
16	Error	Access restricted

9.11. Trim loop current gain #46 (0x2E)

Command 45 and 46 can do a recalibration of the current output 1 loop.
These commands will not destroy the factory current output calibration, but do a second user calibration.
To restore the original values execute a "Factory default" in the Liquiline diagnostics menu or send a command 46 with value 0.0 mA.

Command 46 recalibrates the upper range of the current output.

Before sending command 46 command 40 with a value of 20 mA has to be sent.
The value to be sent with command 46 must be measured with an external ampere meter.

Request data bytes

Byte	Format	Description
0..3	Float	Externally measured loop current [mA]

Response data bytes

Byte	Format	Description
0..3	Float	Loop current [mA]

Command specific response codes

Code	Class	Description
0	Success	No command specific errors
3	Error	Passed parameter too large
4	Error	Passed parameter too small
5	Error	Too few data bytes received
6	Error	Device specific command error
9	Error	Incorrect loop current mode or value
11	Error	Loop current not active (multidrop mode)
16	Error	Access restricted

9.12. Read dynamic variable assignments #50 (0x32)

This command returns the mapping between device and dynamic variables (see chapter 6.2).

Request data bytes

Byte	Format	Description
None		

Response data bytes

Byte	Format	Description
0	Unsigned-8	Device variable assigned to primary variable
1	Unsigned-8	Device variable assigned to secondary variable
2	Unsigned-8	Device variable assigned to tertiary variable
3	Unsigned-8	Device variable assigned to quaternary variable

Command specific response codes

Code	Class	Description
0	Success	No command specific errors

9.13. Write dynamic variable assignments #51 (0x33)

This command sets the mapping between device and dynamic variables (see chapter 6.2).
PV is always mapped to device variable 16.

Request data bytes

Byte	Format	Description
0	Unsigned-8	Has to be 16 (0x10) all the time
1	Unsigned-8	Device variable to assign to secondary variable
2	Unsigned-8	Device variable to assign to tertiary variable
3	Unsigned-8	Device variable to assign to quaternary variable

Response data bytes

Byte	Format	Description
0	Unsigned-8	Device variable assigned to primary variable
1	Unsigned-8	Device variable assigned to secondary variable
2	Unsigned-8	Device variable assigned to tertiary variable
3	Unsigned-8	Device variable assigned to quaternary variable

Command specific response codes

Code	Class	Description
0	Success	No command specific errors
2	Error	Invalid selection
5	Error	Too few data bytes received
6	Error	Device specific command error
16	Error	Access restricted

9.14. Write device variable unit #53 (0x35)

This command selects the unit in which a certain device variable and its range will be returned. Possible units depending on different operating modes are listed in chapter 5.2.

Request data bytes

Byte	Format	Description
0	Unsigned-8	Device variable code
1	Unsigned-8	Device variable unit

Response data bytes

Byte	Format	Description
0	Unsigned-8	Device variable code
1	Unsigned-8	Device variable unit

Command specific response codes

Code	Class	Description
0	Success	No command specific errors
5	Error	Too few data bytes received
6	Error	Device specific command error
11	Error	Invalid device variable code
12	Error	Invalid unit code
16	Error	Access restricted

9.15. Read device variable information #54 (0x36)

This command reads more information about a device variable.
Device variable transducer serial number and family classification are not supported and will return 0.
Damping values are present for certain device variables, only.

Request data bytes

Byte	Format	Description
0	Unsigned-8	Device variable code

Response data bytes

Byte	Format	Description
0	Unsigned-8	Device variable code
1..3	Unsigned-24	Transducer serial number
4	Unsigned-8	Transducer limits and span unit
5..8	Float	Upper transducer limit
9..12	Float	Lower transducer limit
13..16	Float	Damping value [s]
17..20	Float	Minimum span
21	Unsigned-8	Device variable classification
22	Unsigned-8	Device variable family
23..26	Time	Update time period
27	Bits	Device variable properties

Command specific response codes

Code	Class	Description
0	Success	No command specific errors
2	Error	Invalid selection
5	Error	Too few data bytes received

9.16. Write device variable damping value #55 (0x37)

This command writes the damping value of a certain device variable.
The damping value can be set only for certain measurement values. Please refer to chapter 5.2.

Request data bytes

Byte	Format	Description
0	Unsigned-8	Device variable code
1..4	Float	Primary variable damping value [s]

Response data bytes

Byte	Format	Description
0	Unsigned-8	Device variable code
1..4	Float	Primary variable damping value [s]

Command specific response codes

Code	Class	Description
0	Success	No command specific errors
2	Error	Invalid selection
3	Error	Passed parameter too large
5	Error	Passed parameter too small
5	Error	Too few data bytes received
6	Error	Device specific command error
8	Warning	Set to nearest possible value
16	Error	Access restricted

9.17. Write number of response preambles #59 (0x3B)

This command sets the number of response preambles. The value has to be in the range from 5 to 20.

Request data bytes

Byte	Format	Description
0	Unsigned-8	Number of response preambles

Response data bytes

Byte	Format	Description
0	Unsigned-8	Number of response preambles

Command specific response codes

Code	Class	Description
0	Success	No command specific errors
3	Error	Passed parameter too large
4	Error	Passed parameter too small
5	Error	Too few data bytes received
6	Error	Device specific command error
16	Error	Access restricted

9.18. Lock device #71 (0x47)

This command locks the device to one HART master and prevents changes from the other master and the operating panel.
If the device is locked by this command, the local operating panel does not respond to any user action any more.
A lock symbol appears in upper right corner of the display.
If you set a permanent lock and the device looses power, the lock will be set again as soon as the first HART frame is detected. If you have to cancel a permanent lock, use the HART master the lock was set with. If this is not possible then restart the device without HART communication and do a “Factory default” after reboot.

Request data bytes

Byte	Format	Description
0	Unsigned-8	Lock code

Response data bytes

Byte	Format	Description
0	Unsigned-8	Lock code

Command specific response codes

Code	Class	Description
0	Success	No command specific errors
5	Error	Too few data bytes received
6	Error	Device specific command error
10	Error	Invalid lock code
11	Error	Cannot lock device
16	Error	Access restricted

Lock code

Unlock:	0
Lock temporary:	1
Lock permanent:	2
Lock all:	3

9.19. Read lock device state #76 (0x4C)

This command reads the current state of the device lock.

Request data bytes

Byte	Format	Description
None		

Response data bytes

Byte	Format	Description
0	Unsigned-8	Lock code

Command specific response codes

Code	Class	Description
0	Success	No command specific errors

Lock state

Locked:	1
Permanent:	2
Locked by primary master:	4
All locked:	8

9.20. Burst mode

This field device does not support burst mode.

9.21. Catch device variable

This field device does not support the "Catch device variable" mechanism.

10. Device specific commands

It is not recommended to use the device specific commands without a device description (DD) or a device type manager (DTM).
If you have to read or write a special parameter of the Liquiline and cannot use a DD or DTM, please be careful as you might destroy the parameterization.

10.1. Read PEA parameter command #167 (0xA7)

This command is for Endress+Hauser internal use, only.

This command reads the values of one or more parameters.

Request data bytes

Byte	Format	Description
0..1	Unsigned-16	Parameter PEA-ID 0
2..n	Unsigned-16 [ ]	Parameter PEA-ID 1, 2, 3, ... (optional)

Response data bytes

Byte	Format	Description
0..1	Unsigned-16	Parameter PEA-ID 0
2..n	Unsigned-16 [ ]	Parameter PEA-ID 1, 2, 3, ... (optional)
n+1..n+m	Unsigned-8 [ ]	Parameter value 0, 1, 2, 3 ...

Command specific response codes

Code	Class	Description
0	Success	No command specific errors
5	Error	Too few data bytes received
11	Error	Set failed
16	Error	Access restricted

10.2. Write PEA parameter command #168 (0xA8)

This command is for Endress+Hauser internal use, only.

This command writes the value of a parameter.

Request data bytes

Byte	Format	Description
0..1	Unsigned-16	Parameter PEA-ID
2..n	Unsigned-8 [ ]	Parameter value

Response data bytes

Byte	Format	Description
0..1	Unsigned-16	Parameter PEA-ID
2..n	Unsigned-8 [ ]	Parameter value

Command specific response codes

Code	Class	Description
0	Success	No command specific errors
5	Error	Too few data bytes received
11	Error	Set failed
16	Error	Access restricted

10.3. Read HART parameter command #224 (0xE0)

This command reads the value of a parameter.

Request data bytes

Byte	Format	Description
0..1	Unsigned-16	Parameter ID (see chapter 11.1)

Response data bytes

Byte	Format	Description
0..1	Unsigned-16	Parameter ID (see chapter 11.1)
2..n	Unsigned-8 [ ]	Parameter value (see chapter 11.2)

Command specific response codes

Code	Class	Description
0	Success	No command specific errors
2	Error	Invalid selection
5	Error	Too few data bytes received
6	Error	Device specific command error
16	Error	Access restricted

10.4. Write HART parameter command #225 (0xE1)

This command writes the value of a parameter.

Request data bytes

Byte	Format	Description
0..1	Unsigned-16	Parameter ID (see chapter 11.1)
2..n	Unsigned-8 [ ]	Parameter value (see chapter 11.2)

Response data bytes

Byte	Format	Description
0..1	Unsigned-16	Parameter ID (see chapter 11.1)
2..n	Unsigned-8 [ ]	Parameter value (see chapter 11.2)

Command specific response codes

Code	Class	Description
0	Success	No command specific errors
2	Error	Invalid selection
5	Error	Too few data bytes received
6	Error	Device specific command error
11	Error	Set failed
12	Error	Invalid float
16	Error	Access restricted

10.5. Read firmware version #226 (0xE2)

This command reads the firmware version.

Request data bytes

Byte	Format	Description
0	Unsigned-8	Module index (always 0)

Response data bytes

Byte	Format	Description
0	Unsigned-8	Module index
1..16	Latin-1	Software version string

Command specific response codes

Code	Class	Description
0	Success	No command specific errors
2	Error	Invalid selection
5	Error	Too few data bytes received

10.6. Read serial number #227 (0xE3)

This command reads the serial number.

Request data bytes

Byte	Format	Description
0	Unsigned-8	Module index (always 0)

Response data bytes

Byte	Format	Description
0	Unsigned-8	Module index
1..16	Latin-1	Serial number string

Command specific response codes

Code	Class	Description
0	Success	No command specific errors
2	Error	Invalid selection
5	Error	Too few data bytes received

10.7. Read extended order code #228 (0xE4)

This command reads the extended order code. Order codes larger than 20 characters can be read by incrementing the index. 0 will return the first 20 characters, 1 the following 20 and so on.

Request data bytes

Byte	Format	Description
0	Unsigned-8	Index

Response data bytes

Byte	Format	Description
0	Unsigned-8	Index
1..20	Latin-1	Order code string

Command specific response codes

Code	Class	Description
0	Success	No command specific errors
2	Error	Invalid selection
5	Error	Too few data bytes received

10.8. Check device status #231 (0xE7)

This command returns the device status.

Request data bytes

Byte	Format	Description
0	Unsigned-8	Module index (always 0)

Response data bytes

Byte	Format	Description
0	Unsigned-8	Module index
1	Unsigned-8	Device status
2..3	Unsigned-16	Number of the highest priority error

Command specific response codes

Code	Class	Description
0	Success	No command specific errors
2	Error	Invalid selection
5	Error	Too few data bytes received

Device status

OK:	0
F:	1
C:	2
M:	4
S:	8

10.9. Read order code #233 (0xE9)

This command reads the order code.

Request data bytes

Byte	Format	Description
0	Unsigned-8	Module index (always 0)

Response data bytes

Byte	Format	Description
0	Unsigned-8	Module index
1..20	Latin-1	Order code string

Command specific response codes

Code	Class	Description
0	Success	No command specific errors
2	Error	Invalid selection
5	Error	Too few data bytes received

10.10. Read ENP version #234 (0xEA)

This command is for Endress+Hauser internal use, only.

Request data bytes

Byte	Format	Description
0	Unsigned-8	Module index (always 0)

Response data bytes

Byte	Format	Description
0	Unsigned-8	Module index
1..16	Latin-1	ENP version string

Command specific response codes

Code	Class	Description
0	Success	No command specific errors
2	Error	Invalid selection
5	Error	Too few data bytes received

10.11. Read startup behavior #236 (0xEC)

This command reads the startup behavior of Liquiline.

Request data bytes

Byte	Format	Description
None		

Response data bytes

Byte	Format	Description
0..3	Float	Minimal startup voltage [V]
4..7	Float	Startup current [mA]
8..9	Unsigned-16	Time until HART communication possible [s]
10..13	Float	Minimal operating voltage [V]
14..17	Float	Multidrop current [mA]
18..19	Unsigned-16	Time until measurement values are present [s]

Command specific response codes

Code	Class	Description
0	Success	No command specific errors
6	Error	Device specific command error

Minimal startup voltage: 0.0 V
Minimal operating voltage: 0.0 V
Startup current: 0.0 mA
Multidrop current: 4.0 mA
Time till HART communication: 140 s
Time till measurement values: 140 s

10.12. Upload HART parameter #238 (0xEE)

This command is for Endress+Hauser internal use, only.

Request data bytes

Byte	Format	Description
0	Unsigned-8	Reserved
1..2	Unsigned-16	Parameter ID

Response data bytes

Byte	Format	Description
0	Unsigned-8	Reserved
1..2	Unsigned-16	Parameter ID
2..n	Unsigned-8 [ ]	Parameter value

Command specific response codes

Code	Class	Description
0	Success	No command specific errors
2	Error	Invalid selection
5	Error	Too few data bytes received
6	Error	Device specific command error
16	Error	Access restricted

10.13. Download HART parameter #239 (0xEF)

This command is for Endress+Hauser internal use, only.

Request data bytes

Byte	Format	Description
0	Unsigned-8	Reserved
1..2	Unsigned-16	Parameter ID
3..n	Unsigned-8 [ ]	Parameter value

Response data bytes

Byte	Format	Description
0	Unsigned-8	Reserved
1..2	Unsigned-16	Parameter ID
3..n	Unsigned-8 [ ]	Parameter value

Command specific response codes

Code	Class	Description
0	Success	No command specific errors
2	Error	Invalid selection
5	Error	Too few data bytes received
6	Error	Device specific command error
11	Error	Set failed
12	Error	Invalid float
16	Error	Access restricted

11. Tables

11.1. Parameter ID‘s

Menu label	Parameter	Channel	ID	ID Hex	Type	Size
Diagnostics						
Most important message	Highest priority diagnosis		395	018B	String	65
Past message	Last reset diagnosis		396	018C	String	65
Display						
Language	GUI language		45	002D	Enum	1
Backlight	Backlight state		6	0006	Enum	1
Contrast	Contrast		8	0008	Float	5
Screensaver	Screen saver state		11	000B	Enum	1
Screen rotation	Screen rotation switch		12	000C	Enum	1
Automatic hold						
Calibration menu	Hold calibration enabled		39	0027	Enum	1
Hold delay	Hold delay		1	0001	Float	5
Diagnostics menu	Hold diagnostic enabled		37	0025	Enum	1
Setup menu	Hold setup enabled		35	0023	Enum	1
General settings						
Error current	Error current		7	0007	Float	5
Alarm delay	Alarm delay		3	0003	Float	5
Temperature unit	Temperature unit		13	000D	Enum	1
Date/Time	Date and time		2007	07D7	Date	7
Current outputs						
	Connection state	1	2178	0882	Enum	1
	Connection state	2	2179	0883	Enum	1
	Connection state	3	2180	0884	Enum	1
	Connection state	4	2181	0885	Enum	1
	Connection state	5	2184	0888	Enum	1
	Connection state	6	2185	0889	Enum	1
	Connection state	7	2186	088A	Enum	1
	Connection state	8	2187	088B	Enum	1
Hold behavior	Hold behavior	1	980	03D4	Enum	1
Hold behavior	Hold behavior	2	981	03D5	Enum	1
Hold behavior	Hold behavior	3	982	03D6	Enum	1
Hold behavior	Hold behavior	4	983	03D7	Enum	1
Hold behavior	Hold behavior	5	984	03D8	Enum	1
Hold behavior	Hold behavior	6	985	03D9	Enum	1
Hold behavior	Hold behavior	7	986	03DA	Enum	1
Hold behavior	Hold behavior	8	987	03DB	Enum	1
Hold current	Hold current	1	1057	0421	Float	5
Hold current	Hold current	2	1058	0422	Float	5
Hold current	Hold current	3	1059	0423	Float	5
Hold current	Hold current	4	1060	0424	Float	5
Hold current	Hold current	5	1061	0425	Float	5
Hold current	Hold current	6	1062	0426	Float	5
Hold current	Hold current	7	1063	0427	Float	5
Hold current	Hold current	8	1064	0428	Float	5
Range lower value	Lower range	1	988	03DC	Float	5
Range lower value	Lower range	2	989	03DD	Float	5
Range lower value	Lower range	3	990	03DE	Float	5
Range lower value	Lower range	4	991	03DF	Float	5
Range lower value	Lower range	5	992	03E0	Float	5
Range lower value	Lower range	6	993	03E1	Float	5
Range lower value	Lower range	7	994	03E2	Float	5
Range lower value	Lower range	8	995	03E3	Float	5
Range upper value	Upper range	1	996	03E4	Float	5
Range upper value	Upper range	2	997	03E5	Float	5
Range upper value	Upper range	3	998	03E6	Float	5
Range upper value	Upper range	4	999	03E7	Float	5
Range upper value	Upper range	5	1000	03E8	Float	5
Range upper value	Upper range	6	1001	03E9	Float	5
Range upper value	Upper range	7	1002	03EA	Float	5

Menu label	Parameter	Channel	ID	ID Hex	Type	Size
Range upper value	Upper range	8	1003	03EB	Float	5
	Minimum range	1	1028	0404	Float	5
	Minimum range	2	1029	0405	Float	5
	Minimum range	3	1030	0406	Float	5
	Minimum range	4	1031	0407	Float	5
	Minimum range	5	1032	0408	Float	5
	Minimum range	6	1033	0409	Float	5
	Minimum range	7	1034	040A	Float	5
	Minimum range	8	1035	040B	Float	5
	Maximum range	1	1036	040C	Float	5
	Maximum range	2	1037	040D	Float	5
	Maximum range	3	1038	040E	Float	5
	Maximum range	4	1039	040F	Float	5
	Maximum range	5	1040	0410	Float	5
	Maximum range	6	1041	0411	Float	5
	Maximum range	7	1042	0412	Float	5
	Maximum range	8	1043	0413	Float	5
Current	Simulation value	1	1049	0419	Float	5
Current	Simulation value	2	1050	041A	Float	5
Current	Simulation value	3	1051	041B	Float	5
Current	Simulation value	4	1052	041C	Float	5
Current	Simulation value	5	1053	041D	Float	5
Current	Simulation value	6	1054	041E	Float	5
Current	Simulation value	7	1055	041F	Float	5
Current	Simulation value	8	1056	0420	Float	5
Simulation	Simulation state	1	1012	03F4	Enum	1
Simulation	Simulation state	2	1013	03F5	Enum	1
Simulation	Simulation state	3	1014	03F6	Enum	1
Simulation	Simulation state	4	1015	03F7	Enum	1
Simulation	Simulation state	5	1016	03F8	Enum	1
Simulation	Simulation state	6	1017	03F9	Enum	1
Simulation	Simulation state	7	1018	03FA	Enum	1
Simulation	Simulation state	8	1019	03FB	Enum	1
Process values						
pH values						
	pH glass impedance	1	919	0397	Float	5
	pH glass impedance	2	920	0398	Float	5
	pH glass impedance	3	921	0399	Float	5
	pH glass impedance	4	922	039A	Float	5
	pH glass impedance	5	923	039B	Float	5
	pH glass impedance	6	924	039C	Float	5
	pH glass impedance	7	925	039D	Float	5
	pH glass impedance	8	926	039E	Float	5
	pH ORP damped	1	270	010E	Float	5
	pH ORP damped	2	271	010F	Float	5
	pH ORP damped	3	272	0110	Float	5
	pH ORP damped	4	273	0111	Float	5
	pH ORP damped	5	274	0112	Float	5
	pH ORP damped	6	275	0113	Float	5
	pH ORP damped	7	276	0114	Float	5
	pH ORP damped	8	277	0115	Float	5
	pH ORP mV	1	246	00F6	Float	5
	pH ORP mV	2	247	00F7	Float	5
	pH ORP mV	3	248	00F8	Float	5
	pH ORP mV	4	249	00F9	Float	5
	pH ORP mV	5	250	00FA	Float	5
	pH ORP mV	6	251	00FB	Float	5
	pH ORP mV	7	252	00FC	Float	5
	pH ORP mV	8	253	00FD	Float	5
	pH ORP percent	1	254	00FE	Float	5
	pH ORP percent	2	255	00FF	Float	5
	pH ORP percent	3	256	0100	Float	5
	pH ORP percent	4	257	0101	Float	5
	pH ORP percent	5	258	0102	Float	5
	pH ORP percent	6	259	0103	Float	5
	pH ORP percent	7	260	0104	Float	5
	pH ORP percent	8	261	0105	Float	5
	pH ORP raw	1	206	00CE	Float	5
	pH ORP raw	2	207	00CF	Float	5
	pH ORP raw	3	208	00D0	Float	5
	pH ORP raw	4	209	00D1	Float	5
	pH ORP raw	5	210	00D2	Float	5
	pH ORP raw	6	211	00D3	Float	5

Menu label	Parameter	Channel	ID	ID Hex	Type	Size
	pH ORP raw	7	212	00D4	Float	5
	pH ORP raw	8	213	00D5	Float	5
	pH pH compensated	1	286	011E	Float	5
	pH pH compensated	2	287	011F	Float	5
	pH pH compensated	3	288	0120	Float	5
	pH pH compensated	4	289	0121	Float	5
	pH pH compensated	5	290	0122	Float	5
	pH pH compensated	6	291	0123	Float	5
	pH pH compensated	7	292	0124	Float	5
	pH pH compensated	8	293	0125	Float	5
	pH pH damped	1	262	0106	Float	5
	pH pH damped	2	263	0107	Float	5
	pH pH damped	3	264	0108	Float	5
	pH pH damped	4	265	0109	Float	5
	pH pH damped	5	266	010A	Float	5
	pH pH damped	6	267	010B	Float	5
	pH pH damped	7	268	010C	Float	5
	pH pH damped	8	269	010D	Float	5
	pH pH measurement	1	222	00DE	Float	5
	pH pH measurement	2	223	00DF	Float	5
	pH pH measurement	3	224	00E0	Float	5
	pH pH measurement	4	225	00E1	Float	5
	pH pH measurement	5	226	00E2	Float	5
	pH pH measurement	6	227	00E3	Float	5
	pH pH measurement	7	228	00E4	Float	5
	pH pH measurement	8	229	00E5	Float	5
	pH pH raw	1	198	00C6	Float	5
	pH pH raw	2	199	00C7	Float	5
	pH pH raw	3	200	00C8	Float	5
	pH pH raw	4	201	00C9	Float	5
	pH pH raw	5	202	00CA	Float	5
	pH pH raw	6	203	00CB	Float	5
	pH pH raw	7	204	00CC	Float	5
	pH pH raw	8	205	00CD	Float	5
	pH rH measurement	1	238	00EE	Float	5
	pH rH measurement	2	239	00EF	Float	5
	pH rH measurement	3	240	00F0	Float	5
	pH rH measurement	4	241	00F1	Float	5
	pH rH measurement	5	242	00F2	Float	5
	pH rH measurement	6	243	00F3	Float	5
	pH rH measurement	7	244	00F4	Float	5
	pH rH measurement	8	245	00F5	Float	5
	pH temperature damped	1	278	0116	Float	5
	pH temperature damped	2	279	0117	Float	5
	pH temperature damped	3	280	0118	Float	5
	pH temperature damped	4	281	0119	Float	5
	pH temperature damped	5	282	011A	Float	5
	pH temperature damped	6	283	011B	Float	5
	pH temperature damped	7	284	011C	Float	5
	pH temperature damped	8	285	011D	Float	5
	pH temperature measurement	1	230	00E6	Float	5
	pH temperature measurement	2	231	00E7	Float	5
	pH temperature measurement	3	232	00E8	Float	5
	pH temperature measurement	4	233	00E9	Float	5
	pH temperature measurement	5	234	00EA	Float	5
	pH temperature measurement	6	235	00EB	Float	5
	pH temperature measurement	7	236	00EC	Float	5
	pH temperature measurement	8	237	00ED	Float	5
	pH temperature raw	1	214	00D6	Float	5
	pH temperature raw	2	215	00D7	Float	5
	pH temperature raw	3	216	00D8	Float	5
	pH temperature raw	4	217	00D9	Float	5
	pH temperature raw	5	218	00DA	Float	5
	pH temperature raw	6	219	00DB	Float	5
	pH temperature raw	7	220	00DC	Float	5
	pH temperature raw	8	221	00DD	Float	5
ISE values						
	ISE concentration CH0	1	760	02F8	Float	5
	ISE concentration CH0	2	761	02F9	Float	5
	ISE concentration CH0	3	762	02FA	Float	5
	ISE concentration CH0	4	763	02FB	Float	5
	ISE concentration CH0	5	764	02FC	Float	5
	ISE concentration CH0	6	765	02FD	Float	5
	ISE concentration CH0	7	766	02FE	Float	5

Menu label	Parameter	Channel	ID	ID Hex	Type	Size
	ISE concentration CH0	8	767	02FF	Float	5
	ISE concentration CH1	1	768	0300	Float	5
	ISE concentration CH1	2	769	0301	Float	5
	ISE concentration CH1	3	770	0302	Float	5
	ISE concentration CH1	4	771	0303	Float	5
	ISE concentration CH1	5	772	0304	Float	5
	ISE concentration CH1	6	773	0305	Float	5
	ISE concentration CH1	7	774	0306	Float	5
	ISE concentration CH1	8	775	0307	Float	5
	ISE concentration CH2	1	776	0308	Float	5
	ISE concentration CH2	2	777	0309	Float	5
	ISE concentration CH2	3	778	030A	Float	5
	ISE concentration CH2	4	779	030B	Float	5
	ISE concentration CH2	5	780	030C	Float	5
	ISE concentration CH2	6	781	030D	Float	5
	ISE concentration CH2	7	782	030E	Float	5
	ISE concentration CH2	8	783	030F	Float	5
	ISE concentration CH3	1	568	0238	Float	5
	ISE concentration CH3	2	569	0239	Float	5
	ISE concentration CH3	3	570	023A	Float	5
	ISE concentration CH3	4	571	023B	Float	5
	ISE concentration CH3	5	572	023C	Float	5
	ISE concentration CH3	6	573	023D	Float	5
	ISE concentration CH3	7	574	023E	Float	5
	ISE concentration CH3	8	575	023F	Float	5
	ISE concentration damped CH0	1	624	0270	Float	5
	ISE concentration damped CH0	2	625	0271	Float	5
	ISE concentration damped CH0	3	626	0272	Float	5
	ISE concentration damped CH0	4	627	0273	Float	5
	ISE concentration damped CH0	5	628	0274	Float	5
	ISE concentration damped CH0	6	629	0275	Float	5
	ISE concentration damped CH0	7	630	0276	Float	5
	ISE concentration damped CH0	8	631	0277	Float	5
	ISE concentration damped CH1	1	616	0268	Float	5
	ISE concentration damped CH1	2	617	0269	Float	5
	ISE concentration damped CH1	3	618	026A	Float	5
	ISE concentration damped CH1	4	619	026B	Float	5
	ISE concentration damped CH1	5	620	026C	Float	5
	ISE concentration damped CH1	6	621	026D	Float	5
	ISE concentration damped CH1	7	622	026E	Float	5
	ISE concentration damped CH1	8	623	026F	Float	5
	ISE concentration damped CH2	1	640	0280	Float	5
	ISE concentration damped CH2	2	641	0281	Float	5
	ISE concentration damped CH2	3	642	0282	Float	5
	ISE concentration damped CH2	4	643	0283	Float	5
	ISE concentration damped CH2	5	644	0284	Float	5
	ISE concentration damped CH2	6	645	0285	Float	5
	ISE concentration damped CH2	7	646	0286	Float	5
	ISE concentration damped CH2	8	647	0287	Float	5
	ISE concentration damped CH3	1	632	0278	Float	5
	ISE concentration damped CH3	2	633	0279	Float	5
	ISE concentration damped CH3	3	634	027A	Float	5
	ISE concentration damped CH3	4	635	027B	Float	5
	ISE concentration damped CH3	5	636	027C	Float	5
	ISE concentration damped CH3	6	637	027D	Float	5
	ISE concentration damped CH3	7	638	027E	Float	5
	ISE concentration damped CH3	8	639	027F	Float	5
	ISE pH CH0	1	576	0240	Float	5
	ISE pH CH0	2	577	0241	Float	5
	ISE pH CH0	3	578	0242	Float	5
	ISE pH CH0	4	579	0243	Float	5
	ISE pH CH0	5	580	0244	Float	5
	ISE pH CH0	6	581	0245	Float	5
	ISE pH CH0	7	582	0246	Float	5
	ISE pH CH0	8	583	0247	Float	5
	ISE pH CH1	1	584	0248	Float	5
	ISE pH CH1	2	585	0249	Float	5
	ISE pH CH1	3	586	024A	Float	5
	ISE pH CH1	4	587	024B	Float	5
	ISE pH CH1	5	588	024C	Float	5
	ISE pH CH1	6	589	024D	Float	5
	ISE pH CH1	7	590	024E	Float	5
	ISE pH CH1	8	591	024F	Float	5
	ISE pH CH2	1	592	0250	Float	5
	ISE pH CH2	2	593	0251	Float	5
	ISE pH CH2	3	594	0252	Float	5

Menu label	Parameter	Channel	ID	ID Hex	Type	Size
	ISE pH CH2	4	595	0253	Float	5
	ISE pH CH2	5	596	0254	Float	5
	ISE pH CH2	6	597	0255	Float	5
	ISE pH CH2	7	598	0256	Float	5
	ISE pH CH2	8	599	0257	Float	5
	ISE pH CH3	1	600	0258	Float	5
	ISE pH CH3	2	601	0259	Float	5
	ISE pH CH3	3	602	025A	Float	5
	ISE pH CH3	4	603	025B	Float	5
	ISE pH CH3	5	604	025C	Float	5
	ISE pH CH3	6	605	025D	Float	5
	ISE pH CH3	7	606	025E	Float	5
	ISE pH CH3	8	607	025F	Float	5
	ISE pH damped CH0	1	664	0298	Float	5
	ISE pH damped CH0	2	665	0299	Float	5
	ISE pH damped CH0	3	666	029A	Float	5
	ISE pH damped CH0	4	667	029B	Float	5
	ISE pH damped CH0	5	668	029C	Float	5
	ISE pH damped CH0	6	669	029D	Float	5
	ISE pH damped CH0	7	670	029E	Float	5
	ISE pH damped CH0	8	671	029F	Float	5
	ISE pH damped CH1	1	656	0290	Float	5
	ISE pH damped CH1	2	657	0291	Float	5
	ISE pH damped CH1	3	658	0292	Float	5
	ISE pH damped CH1	4	659	0293	Float	5
	ISE pH damped CH1	5	660	0294	Float	5
	ISE pH damped CH1	6	661	0295	Float	5
	ISE pH damped CH1	7	662	0296	Float	5
	ISE pH damped CH1	8	663	0297	Float	5
	ISE pH damped CH2	1	680	02A8	Float	5
	ISE pH damped CH2	2	681	02A9	Float	5
	ISE pH damped CH2	3	682	02AA	Float	5
	ISE pH damped CH2	4	683	02AB	Float	5
	ISE pH damped CH2	5	684	02AC	Float	5
	ISE pH damped CH2	6	685	02AD	Float	5
	ISE pH damped CH2	7	686	02AE	Float	5
	ISE pH damped CH2	8	687	02AF	Float	5
	ISE pH damped CH3	1	672	02A0	Float	5
	ISE pH damped CH3	2	673	02A1	Float	5
	ISE pH damped CH3	3	674	02A2	Float	5
	ISE pH damped CH3	4	675	02A3	Float	5
	ISE pH damped CH3	5	676	02A4	Float	5
	ISE pH damped CH3	6	677	02A5	Float	5
	ISE pH damped CH3	7	678	02A6	Float	5
	ISE pH damped CH3	8	679	02A7	Float	5
	ISE raw voltage CH0	1	720	02D0	Float	5
	ISE raw voltage CH0	2	721	02D1	Float	5
	ISE raw voltage CH0	3	722	02D2	Float	5
	ISE raw voltage CH0	4	723	02D3	Float	5
	ISE raw voltage CH0	5	724	02D4	Float	5
	ISE raw voltage CH0	6	725	02D5	Float	5
	ISE raw voltage CH0	7	726	02D6	Float	5
	ISE raw voltage CH0	8	727	02D7	Float	5
	ISE raw voltage CH1	1	728	02D8	Float	5
	ISE raw voltage CH1	2	729	02D9	Float	5
	ISE raw voltage CH1	3	730	02DA	Float	5
	ISE raw voltage CH1	4	731	02DB	Float	5
	ISE raw voltage CH1	5	732	02DC	Float	5
	ISE raw voltage CH1	6	733	02DD	Float	5
	ISE raw voltage CH1	7	734	02DE	Float	5
	ISE raw voltage CH1	8	735	02DF	Float	5
	ISE raw voltage CH2	1	736	02E0	Float	5
	ISE raw voltage CH2	2	737	02E1	Float	5
	ISE raw voltage CH2	3	738	02E2	Float	5
	ISE raw voltage CH2	4	739	02E3	Float	5
	ISE raw voltage CH2	5	740	02E4	Float	5
	ISE raw voltage CH2	6	741	02E5	Float	5
	ISE raw voltage CH2	7	742	02E6	Float	5
	ISE raw voltage CH2	8	743	02E7	Float	5
	ISE raw voltage CH3	1	744	02E8	Float	5
	ISE raw voltage CH3	2	745	02E9	Float	5
	ISE raw voltage CH3	3	746	02EA	Float	5
	ISE raw voltage CH3	4	747	02EB	Float	5
	ISE raw voltage CH3	5	748	02EC	Float	5
	ISE raw voltage CH3	6	749	02ED	Float	5
	ISE raw voltage CH3	7	750	02EE	Float	5

Menu label	Parameter	Channel	ID	ID Hex	Type	Size
	ISE raw voltage CH3	8	751	02EF	Float	5
	ISE temperature	1	752	02F0	Float	5
	ISE temperature	2	753	02F1	Float	5
	ISE temperature	3	754	02F2	Float	5
	ISE temperature	4	755	02F3	Float	5
	ISE temperature	5	756	02F4	Float	5
	ISE temperature	6	757	02F5	Float	5
	ISE temperature	7	758	02F6	Float	5
	ISE temperature	8	759	02F7	Float	5
	ISE temperature damped	1	608	0260	Float	5
	ISE temperature damped	2	609	0261	Float	5
	ISE temperature damped	3	610	0262	Float	5
	ISE temperature damped	4	611	0263	Float	5
	ISE temperature damped	5	612	0264	Float	5
	ISE temperature damped	6	613	0265	Float	5
	ISE temperature damped	7	614	0266	Float	5
	ISE temperature damped	8	615	0267	Float	5
	ISE voltage CH0	1	712	02C8	Float	5
	ISE voltage CH0	2	713	02C9	Float	5
	ISE voltage CH0	3	714	02CA	Float	5
	ISE voltage CH0	4	715	02CB	Float	5
	ISE voltage CH0	5	716	02CC	Float	5
	ISE voltage CH0	6	717	02CD	Float	5
	ISE voltage CH0	7	718	02CE	Float	5
	ISE voltage CH0	8	719	02CF	Float	5
	ISE voltage CH1	1	704	02C0	Float	5
	ISE voltage CH1	2	705	02C1	Float	5
	ISE voltage CH1	3	706	02C2	Float	5
	ISE voltage CH1	4	707	02C3	Float	5
	ISE voltage CH1	5	708	02C4	Float	5
	ISE voltage CH1	6	709	02C5	Float	5
	ISE voltage CH1	7	710	02C6	Float	5
	ISE voltage CH1	8	711	02C7	Float	5
	ISE voltage CH2	1	696	02B8	Float	5
	ISE voltage CH2	2	697	02B9	Float	5
	ISE voltage CH2	3	698	02BA	Float	5
	ISE voltage CH2	4	699	02BB	Float	5
	ISE voltage CH2	5	700	02BC	Float	5
	ISE voltage CH2	6	701	02BD	Float	5
	ISE voltage CH2	7	702	02BE	Float	5
	ISE voltage CH2	8	703	02BF	Float	5
	ISE voltage CH3	1	688	02B0	Float	5
	ISE voltage CH3	2	689	02B1	Float	5
	ISE voltage CH3	3	690	02B2	Float	5
	ISE voltage CH3	4	691	02B3	Float	5
	ISE voltage CH3	5	692	02B4	Float	5
	ISE voltage CH3	6	693	02B5	Float	5
	ISE voltage CH3	7	694	02B6	Float	5
	ISE voltage CH3	8	695	02B7	Float	5
	ISE voltage damped CH0	1	544	0220	Float	5
	ISE voltage damped CH0	2	545	0221	Float	5
	ISE voltage damped CH0	3	546	0222	Float	5
	ISE voltage damped CH0	4	547	0223	Float	5
	ISE voltage damped CH0	5	548	0224	Float	5
	ISE voltage damped CH0	6	549	0225	Float	5
	ISE voltage damped CH0	7	550	0226	Float	5
	ISE voltage damped CH0	8	551	0227	Float	5
	ISE voltage damped CH1	1	552	0228	Float	5
	ISE voltage damped CH1	2	553	0229	Float	5
	ISE voltage damped CH1	3	554	022A	Float	5
	ISE voltage damped CH1	4	555	022B	Float	5
	ISE voltage damped CH1	5	556	022C	Float	5
	ISE voltage damped CH1	6	557	022D	Float	5
	ISE voltage damped CH1	7	558	022E	Float	5
	ISE voltage damped CH1	8	559	022F	Float	5
	ISE voltage damped CH2	1	560	0230	Float	5
	ISE voltage damped CH2	2	561	0231	Float	5
	ISE voltage damped CH2	3	562	0232	Float	5
	ISE voltage damped CH2	4	563	0233	Float	5
	ISE voltage damped CH2	5	564	0234	Float	5
	ISE voltage damped CH2	6	565	0235	Float	5
	ISE voltage damped CH2	7	566	0236	Float	5
	ISE voltage damped CH2	8	567	0237	Float	5
	ISE voltage damped CH3	1	648	0288	Float	5
	ISE voltage damped CH3	2	649	0289	Float	5
	ISE voltage damped CH3	3	650	028A	Float	5

Menu label	Parameter	Channel	ID	ID Hex	Type	Size
	ISE voltage damped CH3	4	651	028B	Float	5
	ISE voltage damped CH3	5	652	028C	Float	5
	ISE voltage damped CH3	6	653	028D	Float	5
	ISE voltage damped CH3	7	654	028E	Float	5
	ISE voltage damped CH3	8	655	028F	Float	5
Conductivity values						
	Conductivity concentration	1	78	004E	Float	5
	Conductivity concentration	2	79	004F	Float	5
	Conductivity concentration	3	80	0050	Float	5
	Conductivity concentration	4	81	0051	Float	5
	Conductivity concentration	5	82	0052	Float	5
	Conductivity concentration	6	83	0053	Float	5
	Conductivity concentration	7	84	0054	Float	5
	Conductivity concentration	8	85	0055	Float	5
	Conductivity conductivity	1	62	003E	Float	5
	Conductivity conductivity	2	63	003F	Float	5
	Conductivity conductivity	3	64	0040	Float	5
	Conductivity conductivity	4	65	0041	Float	5
	Conductivity conductivity	5	66	0042	Float	5
	Conductivity conductivity	6	67	0043	Float	5
	Conductivity conductivity	7	68	0044	Float	5
	Conductivity conductivity	8	69	0045	Float	5
	Conductivity conductivity damped	1	70	0046	Float	5
	Conductivity conductivity damped	2	71	0047	Float	5
	Conductivity conductivity damped	3	72	0048	Float	5
	Conductivity conductivity damped	4	73	0049	Float	5
	Conductivity conductivity damped	5	74	004A	Float	5
	Conductivity conductivity damped	6	75	004B	Float	5
	Conductivity conductivity damped	7	76	004C	Float	5
	Conductivity conductivity damped	8	77	004D	Float	5
	Conductivity percent limit	1	102	0066	Float	5
	Conductivity percent limit	2	103	0067	Float	5
	Conductivity percent limit	3	104	0068	Float	5
	Conductivity percent limit	4	105	0069	Float	5
	Conductivity percent limit	5	106	006A	Float	5
	Conductivity percent limit	6	107	006B	Float	5
	Conductivity percent limit	7	108	006C	Float	5
	Conductivity percent limit	8	109	006D	Float	5
	Conductivity reciprocal conductivity	1	94	005E	Float	5
	Conductivity reciprocal conductivity	2	95	005F	Float	5
	Conductivity reciprocal conductivity	3	96	0060	Float	5
	Conductivity reciprocal conductivity	4	97	0061	Float	5
	Conductivity reciprocal conductivity	5	98	0062	Float	5
	Conductivity reciprocal conductivity	6	99	0063	Float	5
	Conductivity reciprocal conductivity	7	100	0064	Float	5
	Conductivity reciprocal conductivity	8	101	0065	Float	5
	Conductivity temp. comp. conductivity	1	86	0056	Float	5
	Conductivity temp. comp. conductivity	2	87	0057	Float	5
	Conductivity temp. comp. conductivity	3	88	0058	Float	5
	Conductivity temp. comp. conductivity	4	89	0059	Float	5
	Conductivity temp. comp. conductivity	5	90	005A	Float	5
	Conductivity temp. comp. conductivity	6	91	005B	Float	5
	Conductivity temp. comp. conductivity	7	92	005C	Float	5
	Conductivity temp. comp. conductivity	8	93	005D	Float	5
	Conductivity temperature	1	46	002E	Float	5
	Conductivity temperature	2	47	002F	Float	5
	Conductivity temperature	3	48	0030	Float	5
	Conductivity temperature	4	49	0031	Float	5
	Conductivity temperature	5	50	0032	Float	5
	Conductivity temperature	6	51	0033	Float	5
	Conductivity temperature	7	52	0034	Float	5
	Conductivity temperature	8	53	0035	Float	5
	Conductivity temperature damped	1	54	0036	Float	5
	Conductivity temperature damped	2	55	0037	Float	5
	Conductivity temperature damped	3	56	0038	Float	5
	Conductivity temperature damped	4	57	0039	Float	5
	Conductivity temperature damped	5	58	003A	Float	5
	Conductivity temperature damped	6	59	003B	Float	5
	Conductivity temperature damped	7	60	003C	Float	5
	Conductivity temperature damped	8	61	003D	Float	5
Dissolved oxygen values						
	Diss. oxy. ambient pressure	1	405	0195	Float	5

Menu label	Parameter	Channel	ID	ID Hex	Type	Size
	Diss. oxy. ambient pressure	2	406	0196	Float	5
	Diss. oxy. ambient pressure	3	407	0197	Float	5
	Diss. oxy. ambient pressure	4	408	0198	Float	5
	Diss. oxy. ambient pressure	5	409	0199	Float	5
	Diss. oxy. ambient pressure	6	410	019A	Float	5
	Diss. oxy. ambient pressure	7	411	019B	Float	5
	Diss. oxy. ambient pressure	8	412	019C	Float	5
	Diss. oxy. concentration gas	1	421	01A5	Float	5
	Diss. oxy. concentration gas	2	422	01A6	Float	5
	Diss. oxy. concentration gas	3	423	01A7	Float	5
	Diss. oxy. concentration gas	4	424	01A8	Float	5
	Diss. oxy. concentration gas	5	425	01A9	Float	5
	Diss. oxy. concentration gas	6	426	01AA	Float	5
	Diss. oxy. concentration gas	7	427	01AB	Float	5
	Diss. oxy. concentration gas	8	428	01AC	Float	5
	Diss. oxy. concentration liquid	1	413	019D	Float	5
	Diss. oxy. concentration liquid	2	414	019E	Float	5
	Diss. oxy. concentration liquid	3	415	019F	Float	5
	Diss. oxy. concentration liquid	4	416	01A0	Float	5
	Diss. oxy. concentration liquid	5	417	01A1	Float	5
	Diss. oxy. concentration liquid	6	418	01A2	Float	5
	Diss. oxy. concentration liquid	7	419	01A3	Float	5
	Diss. oxy. concentration liquid	8	420	01A4	Float	5
	Diss. oxy. current compensated	1	142	008E	Float	5
	Diss. oxy. current compensated	2	143	008F	Float	5
	Diss. oxy. current compensated	3	144	0090	Float	5
	Diss. oxy. current compensated	4	145	0091	Float	5
	Diss. oxy. current compensated	5	146	0092	Float	5
	Diss. oxy. current compensated	6	147	0093	Float	5
	Diss. oxy. current compensated	7	148	0094	Float	5
	Diss. oxy. current compensated	8	149	0095	Float	5
	Diss. oxy. current damped	1	397	018D	Float	5
	Diss. oxy. current damped	2	398	018E	Float	5
	Diss. oxy. current damped	3	399	018F	Float	5
	Diss. oxy. current damped	4	400	0190	Float	5
	Diss. oxy. current damped	5	401	0191	Float	5
	Diss. oxy. current damped	6	402	0192	Float	5
	Diss. oxy. current damped	7	403	0193	Float	5
	Diss. oxy. current damped	8	404	0194	Float	5
	Diss. oxy. current raw	1	134	0086	Float	5
	Diss. oxy. current raw	2	135	0087	Float	5
	Diss. oxy. current raw	3	136	0088	Float	5
	Diss. oxy. current raw	4	137	0089	Float	5
	Diss. oxy. current raw	5	138	008A	Float	5
	Diss. oxy. current raw	6	139	008B	Float	5
	Diss. oxy. current raw	7	140	008C	Float	5
	Diss. oxy. current raw	8	141	008D	Float	5
	Diss. oxy. partial pressure	1	150	0096	Float	5
	Diss. oxy. partial pressure	2	151	0097	Float	5
	Diss. oxy. partial pressure	3	152	0098	Float	5
	Diss. oxy. partial pressure	4	153	0099	Float	5
	Diss. oxy. partial pressure	5	154	009A	Float	5
	Diss. oxy. partial pressure	6	155	009B	Float	5
	Diss. oxy. partial pressure	7	156	009C	Float	5
	Diss. oxy. partial pressure	8	157	009D	Float	5
	Diss. oxy. saturation	1	158	009E	Float	5
	Diss. oxy. saturation	2	159	009F	Float	5
	Diss. oxy. saturation	3	160	00A0	Float	5
	Diss. oxy. saturation	4	161	00A1	Float	5
	Diss. oxy. saturation	5	162	00A2	Float	5
	Diss. oxy. saturation	6	163	00A3	Float	5
	Diss. oxy. saturation	7	164	00A4	Float	5
	Diss. oxy. saturation	8	165	00A5	Float	5
	Diss. oxy. tau raw	1	515	0203	Float	5
	Diss. oxy. tau raw	2	516	0204	Float	5
	Diss. oxy. tau raw	3	517	0205	Float	5
	Diss. oxy. tau raw	4	518	0206	Float	5
	Diss. oxy. tau raw	5	519	0207	Float	5
	Diss. oxy. tau raw	6	520	0208	Float	5
	Diss. oxy. tau raw	7	521	0209	Float	5
	Diss. oxy. tau raw	8	522	020A	Float	5
	Diss. oxy. temperature adjusted	1	118	0076	Float	5
	Diss. oxy. temperature adjusted	2	119	0077	Float	5
	Diss. oxy. temperature adjusted	3	120	0078	Float	5
	Diss. oxy. temperature adjusted	4	121	0079	Float	5
	Diss. oxy. temperature adjusted	5	122	007A	Float	5

Menu label	Parameter	Channel	ID	ID Hex	Type	Size
	Diss. oxy. temperature adjusted	6	123	007B	Float	5
	Diss. oxy. temperature adjusted	7	124	007C	Float	5
	Diss. oxy. temperature adjusted	8	125	007D	Float	5
	Diss. oxy. temperature damped	1	126	007E	Float	5
	Diss. oxy. temperature damped	2	127	007F	Float	5
	Diss. oxy. temperature damped	3	128	0080	Float	5
	Diss. oxy. temperature damped	4	129	0081	Float	5
	Diss. oxy. temperature damped	5	130	0082	Float	5
	Diss. oxy. temperature damped	6	131	0083	Float	5
	Diss. oxy. temperature damped	7	132	0084	Float	5
	Diss. oxy. temperature damped	8	133	0085	Float	5
	Diss. oxy. temperature raw	1	110	006E	Float	5
	Diss. oxy. temperature raw	2	111	006F	Float	5
	Diss. oxy. temperature raw	3	112	0070	Float	5
	Diss. oxy. temperature raw	4	113	0071	Float	5
	Diss. oxy. temperature raw	5	114	0072	Float	5
	Diss. oxy. temperature raw	6	115	0073	Float	5
	Diss. oxy. temperature raw	7	116	0074	Float	5
	Diss. oxy. temperature raw	8	117	0075	Float	5
Chlorine values						
	Chlorine concentration	1	2147	0863	Float	5
	Chlorine concentration	2	2148	0864	Float	5
	Chlorine concentration	3	2149	0865	Float	5
	Chlorine concentration	4	2150	0866	Float	5
	Chlorine concentration	5	2151	0867	Float	5
	Chlorine concentration	6	2152	0868	Float	5
	Chlorine concentration	7	2153	0869	Float	5
	Chlorine concentration	8	2154	086A	Float	5
	Chlorine conc. pH compensated	1	2123	084B	Float	5
	Chlorine conc. pH compensated	2	2124	084C	Float	5
	Chlorine conc. pH compensated	3	2125	084D	Float	5
	Chlorine conc. pH compensated	4	2126	084E	Float	5
	Chlorine conc. pH compensated	5	2127	084F	Float	5
	Chlorine conc. pH compensated	6	2128	0850	Float	5
	Chlorine conc. pH compensated	7	2129	0851	Float	5
	Chlorine conc. pH compensated	8	2130	0852	Float	5
	Chlorine current	1	2115	0843	Float	5
	Chlorine current	2	2116	0844	Float	5
	Chlorine current	3	2117	0845	Float	5
	Chlorine current	4	2118	0846	Float	5
	Chlorine current	5	2119	0847	Float	5
	Chlorine current	6	2120	0848	Float	5
	Chlorine current	7	2121	0849	Float	5
	Chlorine current	8	2122	084A	Float	5
	Chlorine just. temperature	1	2155	086B	Float	5
	Chlorine just. temperature	2	2156	086C	Float	5
	Chlorine just. temperature	3	2157	086D	Float	5
	Chlorine just. temperature	4	2158	086E	Float	5
	Chlorine just. temperature	5	2159	086F	Float	5
	Chlorine just. temperature	6	2160	0870	Float	5
	Chlorine just. temperature	7	2161	0871	Float	5
	Chlorine just. temperature	8	2162	0872	Float	5
	Chlorine pH value	1	2163	0873	Float	5
	Chlorine pH value	2	2164	0874	Float	5
	Chlorine pH value	3	2165	0875	Float	5
	Chlorine pH value	4	2166	0876	Float	5
	Chlorine pH value	5	2167	0877	Float	5
	Chlorine pH value	6	2168	0878	Float	5
	Chlorine pH value	7	2169	0879	Float	5
	Chlorine pH value	8	2170	087A	Float	5
	Chlorine raw temperature	1	2107	083B	Float	5
	Chlorine raw temperature	2	2108	083C	Float	5
	Chlorine raw temperature	3	2109	083D	Float	5
	Chlorine raw temperature	4	2110	083E	Float	5
	Chlorine raw temperature	5	2111	083F	Float	5
	Chlorine raw temperature	6	2112	0840	Float	5
	Chlorine raw temperature	7	2113	0841	Float	5
	Chlorine raw temperature	8	2114	0842	Float	5
	Chlorine temp. comp. current	1	2131	0853	Float	5
	Chlorine temp. comp. current	2	2132	0854	Float	5
	Chlorine temp. comp. current	3	2133	0855	Float	5
	Chlorine temp. comp. current	4	2134	0856	Float	5
	Chlorine temp. comp. current	5	2135	0857	Float	5
	Chlorine temp. comp. current	6	2136	0858	Float	5

Menu label	Parameter	Channel	ID	ID Hex	Type	Size
	Chlorine temp. comp. current	7	2137	0859	Float	5
	Chlorine temp. comp. current	8	2138	085A	Float	5
	Chlorine temp. comp. current damped	1	2099	0833	Float	5
	Chlorine temp. comp. current damped	2	2100	0834	Float	5
	Chlorine temp. comp. current damped	3	2101	0835	Float	5
	Chlorine temp. comp. current damped	4	2102	0836	Float	5
	Chlorine temp. comp. current damped	5	2103	0837	Float	5
	Chlorine temp. comp. current damped	6	2104	0838	Float	5
	Chlorine temp. comp. current damped	7	2105	0839	Float	5
	Chlorine temp. comp. current damped	8	2106	083A	Float	5
	Chlorine temperature damped	1	2139	085B	Float	5
	Chlorine temperature damped	2	2140	085C	Float	5
	Chlorine temperature damped	3	2141	085D	Float	5
	Chlorine temperature damped	4	2142	085E	Float	5
	Chlorine temperature damped	5	2143	085F	Float	5
	Chlorine temperature damped	6	2144	0860	Float	5
	Chlorine temperature damped	7	2145	0861	Float	5
	Chlorine temperature damped	8	2146	0862	Float	5
Turbidity values						
	Turbidity temperature	1	294	0126	Float	5
	Turbidity temperature	2	295	0127	Float	5
	Turbidity temperature	3	296	0128	Float	5
	Turbidity temperature	4	297	0129	Float	5
	Turbidity temperature	5	298	012A	Float	5
	Turbidity temperature	6	299	012B	Float	5
	Turbidity temperature	7	300	012C	Float	5
	Turbidity temperature	8	301	012D	Float	5
	Turbidity temperature damped	1	302	012E	Float	5
	Turbidity temperature damped	2	303	012F	Float	5
	Turbidity temperature damped	3	304	0130	Float	5
	Turbidity temperature damped	4	305	0131	Float	5
	Turbidity temperature damped	5	306	0132	Float	5
	Turbidity temperature damped	6	307	0133	Float	5
	Turbidity temperature damped	7	308	0134	Float	5
	Turbidity temperature damped	8	309	0135	Float	5
	Turbidity turbidity	1	310	0136	Float	5
	Turbidity turbidity	2	311	0137	Float	5
	Turbidity turbidity	3	312	0138	Float	5
	Turbidity turbidity	4	313	0139	Float	5
	Turbidity turbidity	5	314	013A	Float	5
	Turbidity turbidity	6	315	013B	Float	5
	Turbidity turbidity	7	316	013C	Float	5
	Turbidity turbidity	8	317	013D	Float	5
	Turbidity turbidity cust.	1	379	017B	Float	5
	Turbidity turbidity cust.	2	380	017C	Float	5
	Turbidity turbidity cust.	3	381	017D	Float	5
	Turbidity turbidity cust.	4	382	017E	Float	5
	Turbidity turbidity cust.	5	383	017F	Float	5
	Turbidity turbidity cust.	6	384	0180	Float	5
	Turbidity turbidity cust.	7	385	0181	Float	5
	Turbidity turbidity cust.	8	386	0182	Float	5
	Turbidity turbidity percent	1	447	01BF	Float	5
	Turbidity turbidity percent	2	448	01C0	Float	5
	Turbidity turbidity percent	3	449	01C1	Float	5
	Turbidity turbidity percent	4	450	01C2	Float	5
	Turbidity turbidity percent	5	451	01C3	Float	5
	Turbidity turbidity percent	6	452	01C4	Float	5
	Turbidity turbidity percent	7	453	01C5	Float	5
	Turbidity turbidity percent	8	454	01C6	Float	5
	Turbidity turbidity ppm	1	431	01AF	Float	5
	Turbidity turbidity ppm	2	432	01B0	Float	5
	Turbidity turbidity ppm	3	433	01B1	Float	5
	Turbidity turbidity ppm	4	434	01B2	Float	5
	Turbidity turbidity ppm	5	435	01B3	Float	5
	Turbidity turbidity ppm	6	436	01B4	Float	5
	Turbidity turbidity ppm	7	437	01B5	Float	5
	Turbidity turbidity ppm	8	438	01B6	Float	5
	Turbidity turbidity cust. damped	1	387	0183	Float	5
	Turbidity turbidity cust. damped	2	388	0184	Float	5
	Turbidity turbidity cust. damped	3	389	0185	Float	5
	Turbidity turbidity cust. damped	4	390	0186	Float	5
	Turbidity turbidity cust. damped	5	391	0187	Float	5
	Turbidity turbidity cust. damped	6	392	0188	Float	5
	Turbidity turbidity cust. damped	7	393	0189	Float	5

Menu label	Parameter	Channel	ID	ID Hex	Type	Size
	Turbidity turbidity cust. damped	8	394	018A	Float	5
	Turbidity turbidity damped	1	318	013E	Float	5
	Turbidity turbidity damped	2	319	013F	Float	5
	Turbidity turbidity damped	3	320	0140	Float	5
	Turbidity turbidity damped	4	321	0141	Float	5
	Turbidity turbidity damped	5	322	0142	Float	5
	Turbidity turbidity damped	6	323	0143	Float	5
	Turbidity turbidity damped	7	324	0144	Float	5
	Turbidity turbidity damped	8	325	0145	Float	5
	Turbidity turbidity percent damped	1	455	01C7	Float	5
	Turbidity turbidity percent damped	2	456	01C8	Float	5
	Turbidity turbidity percent damped	3	457	01C9	Float	5
	Turbidity turbidity percent damped	4	458	01CA	Float	5
	Turbidity turbidity percent damped	5	459	01CB	Float	5
	Turbidity turbidity percent damped	6	460	01CC	Float	5
	Turbidity turbidity percent damped	7	461	01CD	Float	5
	Turbidity turbidity percent damped	8	462	01CE	Float	5
	Turbidity turbidity ppm damped	1	439	01B7	Float	5
	Turbidity turbidity ppm damped	2	440	01B8	Float	5
	Turbidity turbidity ppm damped	3	441	01B9	Float	5
	Turbidity turbidity ppm damped	4	442	01BA	Float	5
	Turbidity turbidity ppm damped	5	443	01BB	Float	5
	Turbidity turbidity ppm damped	6	444	01BC	Float	5
	Turbidity turbidity ppm damped	7	445	01BD	Float	5
	Turbidity turbidity ppm damped	8	446	01BE	Float	5
Nitrate values						
	Nitrate	1	182	00B6	Float	5
	Nitrate	2	183	00B7	Float	5
	Nitrate	3	184	00B8	Float	5
	Nitrate	4	185	00B9	Float	5
	Nitrate	5	186	00BA	Float	5
	Nitrate	6	187	00BB	Float	5
	Nitrate	7	188	00BC	Float	5
	Nitrate	8	189	00BD	Float	5
	Nitrate NO3	1	363	016B	Float	5
	Nitrate NO3	2	364	016C	Float	5
	Nitrate NO3	3	365	016D	Float	5
	Nitrate NO3	4	366	016E	Float	5
	Nitrate NO3	5	367	016F	Float	5
	Nitrate NO3	6	368	0170	Float	5
	Nitrate NO3	7	369	0171	Float	5
	Nitrate NO3	8	370	0172	Float	5
	Nitrate damped	1	190	00BE	Float	5
	Nitrate damped	2	191	00BF	Float	5
	Nitrate damped	3	192	00C0	Float	5
	Nitrate damped	4	193	00C1	Float	5
	Nitrate damped	5	194	00C2	Float	5
	Nitrate damped	6	195	00C3	Float	5
	Nitrate damped	7	196	00C4	Float	5
	Nitrate damped	8	197	00C5	Float	5
	Nitrate NO3 damped	1	371	0173	Float	5
	Nitrate NO3 damped	2	372	0174	Float	5
	Nitrate NO3 damped	3	373	0175	Float	5
	Nitrate NO3 damped	4	374	0176	Float	5
	Nitrate NO3 damped	5	375	0177	Float	5
	Nitrate NO3 damped	6	376	0178	Float	5
	Nitrate NO3 damped	7	377	0179	Float	5
	Nitrate NO3 damped	8	378	017A	Float	5
	Nitrate temperature	1	166	00A6	Float	5
	Nitrate temperature	2	167	00A7	Float	5
	Nitrate temperature	3	168	00A8	Float	5
	Nitrate temperature	4	169	00A9	Float	5
	Nitrate temperature	5	170	00AA	Float	5
	Nitrate temperature	6	171	00AB	Float	5
	Nitrate temperature	7	172	00AC	Float	5
	Nitrate temperature	8	173	00AD	Float	5
	Nitrate temperature damped	1	174	00AE	Float	5
	Nitrate temperature damped	2	175	00AF	Float	5
	Nitrate temperature damped	3	176	00B0	Float	5
	Nitrate temperature damped	4	177	00B1	Float	5
	Nitrate temperature damped	5	178	00B2	Float	5
	Nitrate temperature damped	6	179	00B3	Float	5
	Nitrate temperature damped	7	180	00B4	Float	5
	Nitrate temperature damped	8	181	00B5	Float	5

Menu label	Parameter	Channel	ID	ID Hex	Type	Size
SAC values						
	SAC absorption	1	880	0370	Float	5
	SAC absorption	2	881	0371	Float	5
	SAC absorption	3	882	0372	Float	5
	SAC absorption	4	883	0373	Float	5
	SAC absorption	5	884	0374	Float	5
	SAC absorption	6	885	0375	Float	5
	SAC absorption	7	886	0376	Float	5
	SAC absorption	8	887	0377	Float	5
	SAC absorption damped	1	904	0388	Float	5
	SAC absorption damped	2	905	0389	Float	5
	SAC absorption damped	3	906	038A	Float	5
	SAC absorption damped	4	907	038B	Float	5
	SAC absorption damped	5	908	038C	Float	5
	SAC absorption damped	6	909	038D	Float	5
	SAC absorption damped	7	910	038E	Float	5
	SAC absorption damped	8	911	038F	Float	5
	SAC BOD	1	864	0360	Float	5
	SAC BOD	2	865	0361	Float	5
	SAC BOD	3	866	0362	Float	5
	SAC BOD	4	867	0363	Float	5
	SAC BOD	5	868	0364	Float	5
	SAC BOD	6	869	0365	Float	5
	SAC BOD	7	870	0366	Float	5
	SAC BOD	8	871	0367	Float	5
	SAC BOD damped	1	840	0348	Float	5
	SAC BOD damped	2	841	0349	Float	5
	SAC BOD damped	3	842	034A	Float	5
	SAC BOD damped	4	843	034B	Float	5
	SAC BOD damped	5	844	034C	Float	5
	SAC BOD damped	6	845	034D	Float	5
	SAC BOD damped	7	846	034E	Float	5
	SAC BOD damped	8	847	034F	Float	5
	SAC COD	1	816	0330	Float	5
	SAC COD	2	817	0331	Float	5
	SAC COD	3	818	0332	Float	5
	SAC COD	4	819	0333	Float	5
	SAC COD	5	820	0334	Float	5
	SAC COD	6	821	0335	Float	5
	SAC COD	7	822	0336	Float	5
	SAC COD	8	823	0337	Float	5
	SAC COD damped	1	784	0310	Float	5
	SAC COD damped	2	785	0311	Float	5
	SAC COD damped	3	786	0312	Float	5
	SAC COD damped	4	787	0313	Float	5
	SAC COD damped	5	788	0314	Float	5
	SAC COD damped	6	789	0315	Float	5
	SAC COD damped	7	790	0316	Float	5
	SAC COD damped	8	791	0317	Float	5
	SAC DOC	1	792	0318	Float	5
	SAC DOC	2	793	0319	Float	5
	SAC DOC	3	794	031A	Float	5
	SAC DOC	4	795	031B	Float	5
	SAC DOC	5	796	031C	Float	5
	SAC DOC	6	797	031D	Float	5
	SAC DOC	7	798	031E	Float	5
	SAC DOC	8	799	031F	Float	5
	SAC DOC damped	1	832	0340	Float	5
	SAC DOC damped	2	833	0341	Float	5
	SAC DOC damped	3	834	0342	Float	5
	SAC DOC damped	4	835	0343	Float	5
	SAC DOC damped	5	836	0344	Float	5
	SAC DOC damped	6	837	0345	Float	5
	SAC DOC damped	7	838	0346	Float	5
	SAC DOC damped	8	839	0347	Float	5
	SAC SAC	1	896	0380	Float	5
	SAC SAC	2	897	0381	Float	5
	SAC SAC	3	898	0382	Float	5
	SAC SAC	4	899	0383	Float	5
	SAC SAC	5	900	0384	Float	5
	SAC SAC	6	901	0385	Float	5
	SAC SAC	7	902	0386	Float	5
	SAC SAC	8	903	0387	Float	5
	SAC SAC damped	1	824	0338	Float	5

Menu label	Parameter	Channel	ID	ID Hex	Type	Size
	SAC SAC damped	2	825	0339	Float	5
	SAC SAC damped	3	826	033A	Float	5
	SAC SAC damped	4	827	033B	Float	5
	SAC SAC damped	5	828	033C	Float	5
	SAC SAC damped	6	829	033D	Float	5
	SAC SAC damped	7	830	033E	Float	5
	SAC SAC damped	8	831	033F	Float	5
	SAC temperature	1	872	0368	Float	5
	SAC temperature	2	873	0369	Float	5
	SAC temperature	3	874	036A	Float	5
	SAC temperature	4	875	036B	Float	5
	SAC temperature	5	876	036C	Float	5
	SAC temperature	6	877	036D	Float	5
	SAC temperature	7	878	036E	Float	5
	SAC temperature	8	879	036F	Float	5
	SAC temperature damped	1	856	0358	Float	5
	SAC temperature damped	2	857	0359	Float	5
	SAC temperature damped	3	858	035A	Float	5
	SAC temperature damped	4	859	035B	Float	5
	SAC temperature damped	5	860	035C	Float	5
	SAC temperature damped	6	861	035D	Float	5
	SAC temperature damped	7	862	035E	Float	5
	SAC temperature damped	8	863	035F	Float	5
	SAC TOC	1	800	0320	Float	5
	SAC TOC	2	801	0321	Float	5
	SAC TOC	3	802	0322	Float	5
	SAC TOC	4	803	0323	Float	5
	SAC TOC	5	804	0324	Float	5
	SAC TOC	6	805	0325	Float	5
	SAC TOC	7	806	0326	Float	5
	SAC TOC	8	807	0327	Float	5
	SAC TOC damped	1	848	0350	Float	5
	SAC TOC damped	2	849	0351	Float	5
	SAC TOC damped	3	850	0352	Float	5
	SAC TOC damped	4	851	0353	Float	5
	SAC TOC damped	5	852	0354	Float	5
	SAC TOC damped	6	853	0355	Float	5
	SAC TOC damped	7	854	0356	Float	5
	SAC TOC damped	8	855	0357	Float	5
	SAC transmission	1	808	0328	Float	5
	SAC transmission	2	809	0329	Float	5
	SAC transmission	3	810	032A	Float	5
	SAC transmission	4	811	032B	Float	5
	SAC transmission	5	812	032C	Float	5
	SAC transmission	6	813	032D	Float	5
	SAC transmission	7	814	032E	Float	5
	SAC transmission	8	815	032F	Float	5
	SAC transmission damped	1	888	0378	Float	5
	SAC transmission damped	2	889	0379	Float	5
	SAC transmission damped	3	890	037A	Float	5
	SAC transmission damped	4	891	037B	Float	5
	SAC transmission damped	5	892	037C	Float	5
	SAC transmission damped	6	893	037D	Float	5
	SAC transmission damped	7	894	037E	Float	5
	SAC transmission damped	8	895	037F	Float	5
Ultrasonic interface values						
	UIS level	1	2083	0823	Float	5
	UIS level	2	2084	0824	Float	5
	UIS level	3	2085	0825	Float	5
	UIS level	4	2086	0826	Float	5
	UIS level	5	2087	0827	Float	5
	UIS level	6	2088	0828	Float	5
	UIS level	7	2089	0829	Float	5
	UIS level	8	2090	082A	Float	5
	UIS turbidity	1	2091	082B	Float	5
	UIS turbidity	2	2092	082C	Float	5
	UIS turbidity	3	2093	082D	Float	5
	UIS turbidity	4	2094	082E	Float	5
	UIS turbidity	5	2095	082F	Float	5
	UIS turbidity	6	2096	0830	Float	5
	UIS turbidity	7	2097	0831	Float	5
	UIS turbidity	8	2098	0832	Float	5

Menu label	Parameter	Channel	ID	ID Hex	Type	Size
Analog input values						
	Input analog	1	335	014F	Float	5
	Input analog	2	336	0150	Float	5
	Input analog	3	337	0151	Float	5
Current input values						
	Input current flow rate	1	468	01D4	Float	5
	Input current flow rate	2	469	01D5	Float	5
	Input current flow rate	3	470	01D6	Float	5
	Input current flow rate	4	471	01D7	Float	5
	Input current flow rate	5	2201	0899	Float	5
	Input current flow rate	6	2202	089A	Float	5
	Input current parameter	1	476	01DC	Float	5
	Input current parameter	2	477	01DD	Float	5
	Input current parameter	3	478	01DE	Float	5
	Input current parameter	4	479	01DF	Float	5
	Input current parameter	5	2205	089D	Float	5
	Input current parameter	6	2206	089E	Float	5
	Input current totalized flow rate	1	472	01D8	Float	5
	Input current totalized flow rate	2	473	01D9	Float	5
	Input current totalized flow rate	3	474	01DA	Float	5
	Input current totalized flow rate	4	475	01DB	Float	5
	Input current totalized flow rate	5	2203	089B	Float	5
	Input current totalized flow rate	6	2204	089C	Float	5
	Input current	1	464	01D0	Float	5
	Input current	2	465	01D1	Float	5
	Input current	3	466	01D2	Float	5
	Input current	4	467	01D3	Float	5
	Input current	5	2199	0897	Float	5
	Input current	6	2200	0898	Float	5
Binary input values						
	Input binary edge counter	1	526	020E	Float	5
	Input binary edge counter	2	527	020F	Float	5
	Input binary edge counter	3	528	0210	Float	5
	Input binary edge counter	4	529	0211	Float	5
	Input binary edge counter	5	530	0212	Float	5
	Input binary edge counter	6	531	0213	Float	5
	Input binary edges per second	1	532	0214	Float	5
	Input binary edges per second	2	533	0215	Float	5
	Input binary edges per second	3	534	0216	Float	5
	Input binary edges per second	4	535	0217	Float	5
	Input binary edges per second	5	536	0218	Float	5
	Input binary edges per second	6	537	0219	Float	5
	Input binary flow rate per time	1	480	01E0	Float	5
	Input binary flow rate per time	2	481	01E1	Float	5
	Input binary flow rate per time	3	482	01E2	Float	5
	Input binary flow rate per time	4	483	01E3	Float	5
	Input binary flow rate per time	5	484	01E4	Float	5
	Input binary flow rate per time	6	485	01E5	Float	5
	Input binary flow rate totalized	1	486	01E6	Float	5
	Input binary flow rate totalized	2	487	01E7	Float	5
	Input binary flow rate totalized	3	488	01E8	Float	5
	Input binary flow rate totalized	4	489	01E9	Float	5
	Input binary flow rate totalized	5	490	01EA	Float	5
	Input binary flow rate totalized	6	491	01EB	Float	5
	Input binary rainfall per time	1	492	01EC	Float	5
	Input binary rainfall per time	2	493	01ED	Float	5
	Input binary rainfall per time	3	494	01EE	Float	5
	Input binary rainfall per time	4	495	01EF	Float	5
	Input binary rainfall per time	5	496	01F0	Float	5
	Input binary rainfall per time	6	497	01F1	Float	5
	Input binary rainfall totalized	1	498	01F2	Float	5
	Input binary rainfall totalized	2	499	01F3	Float	5
	Input binary rainfall totalized	3	500	01F4	Float	5
	Input binary rainfall totalized	4	501	01F5	Float	5
	Input binary rainfall totalized	5	502	01F6	Float	5
	Input binary rainfall totalized	6	503	01F7	Float	5
	Input binary	1	338	0152	Float	5
	Input binary	2	339	0153	Float	5
	Input binary	3	340	0154	Float	5
	Input binary	4	341	0155	Float	5

Menu label	Parameter	Channel	ID	ID Hex	Type	Size
	Input binary	5	342	0156	Float	5
	Input binary	6	343	0157	Float	5
Mathematical function values						
	Degassed conductivity	1	962	03C2	Float	5
	Degassed conductivity	2	963	03C3	Float	5
	Degassed conductivity	3	964	03C4	Float	5
	Degassed conductivity	4	965	03C5	Float	5
	Degassed conductivity	5	966	03C6	Float	5
	Degassed conductivity	6	967	03C7	Float	5
	Difference	1	974	03CE	Float	5
	Difference	2	975	03CF	Float	5
	Difference	3	976	03D0	Float	5
	Difference	4	977	03D1	Float	5
	Difference	5	978	03D2	Float	5
	Difference	6	979	03D3	Float	5
	Difference conductivity	1	944	03B0	Float	5
	Difference conductivity	2	945	03B1	Float	5
	Difference conductivity	3	946	03B2	Float	5
	Difference conductivity	4	947	03B3	Float	5
	Difference conductivity	5	948	03B4	Float	5
	Difference conductivity	6	949	03B5	Float	5
	pH calculation	1	968	03C8	Float	5
	pH calculation	2	969	03C9	Float	5
	pH calculation	3	970	03CA	Float	5
	pH calculation	4	971	03CB	Float	5
	pH calculation	5	972	03CC	Float	5
	pH calculation	6	973	03CD	Float	5
	Redundancy	1	950	03B6	Float	5
	Redundancy	2	951	03B7	Float	5
	Redundancy	3	952	03B8	Float	5
	Redundancy	4	953	03B9	Float	5
	Redundancy	5	954	03BA	Float	5
	Redundancy	6	955	03BB	Float	5
	rH calculation	1	956	03BC	Float	5
	rH calculation	2	957	03BD	Float	5
	rH calculation	3	958	03BE	Float	5
	rH calculation	4	959	03BF	Float	5
	rH calculation	5	960	03C0	Float	5
	rH calculation	6	961	03C1	Float	5
Controller values						
	Controller output bipolar	1	429	01AD	Float	5
	Controller output bipolar	2	430	01AE	Float	5
	Controller output unipolar minus	1	506	01FA	Float	5
	Controller output unipolar minus	2	507	01FB	Float	5
	Controller output unipolar plus	1	504	01F8	Float	5
	Controller output unipolar plus	2	505	01F9	Float	5
Current output values						
	Output current	1	346	015A	Float	5
	Output current	2	347	015B	Float	5
	Output current	3	348	015C	Float	5
	Output current	4	349	015D	Float	5
	Output current	5	350	015E	Float	5
	Output current	6	351	015F	Float	5
	Output current	7	352	0160	Float	5
	Output current	8	353	0161	Float	5
Binary output values						
	Output binary	1	344	0158	Float	5
	Output binary	2	345	0159	Float	5
Relay output values						
	Output alarm relay		525	020D	Float	5
	Output relay	1	354	0162	Float	5
	Output relay	2	355	0163	Float	5
	Output relay	3	356	0164	Float	5
	Output relay	4	357	0165	Float	5
	Output relay	5	358	0166	Float	5
	Output relay	*6*	*359*	*0167*	*Float*	*5*

Menu label	Parameter	Channel	ID	ID Hex	Type	Size
	Output relay	7	360	0168	Float	5
	Output relay	8	361	0169	Float	5
Limit switch values						
	Limit switch value	1	2191	088F	Float	5
	Limit switch value	2	2192	0890	Float	5
	Limit switch value	3	2193	0891	Float	5
	Limit switch value	4	2194	0892	Float	5
	Limit switch value	5	2195	0893	Float	5
	Limit switch value	6	2196	0894	Float	5
	Limit switch value	7	2197	0895	Float	5
	Limit switch value	8	2198	0896	Float	5
Sensor extreme values						
	Specification max.	1	1409	0581	Float	5
	Specification max.	2	1410	0582	Float	5
	Specification max.	3	1411	0583	Float	5
	Specification max.	4	1412	0584	Float	5
	Specification max.	5	1413	0585	Float	5
	Specification max.	6	1414	0586	Float	5
	Specification max.	7	1415	0587	Float	5
	Specification max.	8	1416	0588	Float	5
	Specification min.	1	1433	0599	Float	5
	Specification min.	2	1434	059A	Float	5
	Specification min.	3	1435	059B	Float	5
	Specification min.	4	1436	059C	Float	5
	Specification min.	5	1437	059D	Float	5
	Specification min.	6	1438	059E	Float	5
	Specification min.	7	1439	059F	Float	5
	Specification min.	8	1440	05A0	Float	5
	Temperature max.	1	1233	04D1	Float	5
	Temperature max.	2	1234	04D2	Float	5
	Temperature max.	3	1235	04D3	Float	5
	Temperature max.	4	1236	04D4	Float	5
	Temperature max.	5	1237	04D5	Float	5
	Temperature max.	6	1238	04D6	Float	5
	Temperature max.	7	1239	04D7	Float	5
	Temperature max.	8	1240	04D8	Float	5
	Temperature min.	1	1089	0441	Float	5
	Temperature min.	2	1090	0442	Float	5
	Temperature min.	3	1091	0443	Float	5
	Temperature min.	4	1092	0444	Float	5
	Temperature min.	5	1093	0445	Float	5
	Temperature min.	6	1094	0446	Float	5
	Temperature min.	7	1095	0447	Float	5
	Temperature min.	8	1096	0448	Float	5
Sensor general information						
	Hardware version	1	1097	0449	String	17
	Hardware version	2	1098	044A	String	17
	Hardware version	3	1099	044B	String	17
	Hardware version	4	1100	044C	String	17
	Hardware version	5	1101	044D	String	17
	Hardware version	6	1102	044E	String	17
	Hardware version	7	1103	044F	String	17
	Hardware version	8	1104	0450	String	17
	Initial operation date	1	1169	0491	Date	7
	Initial operation date	2	1170	0492	Date	7
	Initial operation date	3	1171	0493	Date	7
	Initial operation date	4	1172	0494	Date	7
	Initial operation date	5	1173	0495	Date	7
	Initial operation date	6	1174	0496	Date	7
	Initial operation date	7	1175	0497	Date	7
	Initial operation date	8	1176	0498	Date	7
	Manufacturer	1	1073	0431	String	33
	Manufacturer	2	1074	0432	String	33
	Manufacturer	3	1075	0433	String	33
	Manufacturer	4	1076	0434	String	33
	Manufacturer	5	1077	0435	String	33
	Manufacturer	6	1078	0436	String	33
	Manufacturer	7	1079	0437	String	33
	Manufacturer	8	1080	0438	String	33
	Manufacturing date	1	1105	0451	Date	7

Menu label	Parameter	Channel	ID	ID Hex	Type	Size
	Manufacturing date	2	1106	0452	Date	7
	Manufacturing date	3	1107	0453	Date	7
	Manufacturing date	4	1108	0454	Date	7
	Manufacturing date	5	1109	0455	Date	7
	Manufacturing date	6	1110	0456	Date	7
	Manufacturing date	7	1111	0457	Date	7
	Manufacturing date	8	1112	0458	Date	7
	Order code	1	1185	04A1	String	33
	Order code	2	1186	04A2	String	33
	Order code	3	1187	04A3	String	33
	Order code	4	1188	04A4	String	33
	Order code	5	1189	04A5	String	33
	Order code	6	1190	04A6	String	33
	Order code	7	1191	04A7	String	33
	Order code	8	1192	04A8	String	33
	Serial number	1	1193	04A9	String	17
	Serial number	2	1194	04AA	String	17
	Serial number	3	1195	04AB	String	17
	Serial number	4	1196	04AC	String	17
	Serial number	5	1197	04AD	String	17
	Serial number	6	1198	04AE	String	17
	Serial number	7	1199	04AF	String	17
	Serial number	8	1200	04B0	String	17
	Software version	1	1129	0469	String	17
	Software version	2	1130	046A	String	17
	Software version	3	1131	046B	String	17
	Software version	4	1132	046C	String	17
	Software version	5	1133	046D	String	17
	Software version	6	1134	046E	String	17
	Software version	7	1135	046F	String	17
	Software version	8	1136	0470	String	17
	Tag	1	1081	0439	String	33
	Tag	2	1082	043A	String	33
	Tag	3	1083	043B	String	33
	Tag	4	1084	043C	String	33
	Tag	5	1085	043D	String	33
	Tag	6	1086	043E	String	33
	Tag	7	1087	043F	String	33
	Tag	8	1088	0440	String	33
	Tag group	1	1177	0499	Unsigned 16	2
	Tag group	2	1178	049A	Unsigned 16	2
	Tag group	3	1179	049B	Unsigned 16	2
	Tag group	4	1180	049C	Unsigned 16	2
	Tag group	5	1181	049D	Unsigned 16	2
	Tag group	6	1182	049E	Unsigned 16	2
	Tag group	7	1183	049F	Unsigned 16	2
	Tag group	8	1184	04A0	Unsigned 16	2
Sensor operating times						
	Above spec. temp. max.	1	1385	0569	Float	5
	Above spec. temp. max.	2	1386	056A	Float	5
	Above spec. temp. max.	3	1387	056B	Float	5
	Above spec. temp. max.	4	1388	056C	Float	5
	Above spec. temp. max.	5	1389	056D	Float	5
	Above spec. temp. max.	6	1390	056E	Float	5
	Above spec. temp. max.	7	1391	056F	Float	5
	Above spec. temp. max.	8	1392	0570	Float	5
	Below spec. temp. min.	1	1249	04E1	Float	5
	Below spec. temp. min.	2	1250	04E2	Float	5
	Below spec. temp. min.	3	1251	04E3	Float	5
	Below spec. temp. min.	4	1252	04E4	Float	5
	Below spec. temp. min.	5	1253	04E5	Float	5
	Below spec. temp. min.	6	1254	04E6	Float	5
	Below spec. temp. min.	7	1255	04E7	Float	5
	Below spec. temp. min.	8	1256	04E8	Float	5
	Calib. timer	1	1241	04D9	Float	5
	Calib. timer	2	1242	04DA	Float	5
	Calib. timer	3	1243	04DB	Float	5
	Calib. timer	4	1244	04DC	Float	5
	Calib. timer	5	1245	04DD	Float	5
	Calib. timer	6	1246	04DE	Float	5
	Calib. timer	7	1247	04DF	Float	5
	Calib. timer	8	1248	04E0	Float	5
	Cap calibrations	1	1369	0559	Unsigned 16	2
	Cap calibrations	2	1370	055A	Unsigned 16	2

Menu label	Parameter	Channel	ID	ID Hex	Type	Size
	Cap calibrations	3	1371	055B	Unsigned 16	2
	Cap calibrations	4	1372	055C	Unsigned 16	2
	Cap calibrations	5	1373	055D	Unsigned 16	2
	Cap calibrations	6	1374	055E	Unsigned 16	2
	Cap calibrations	7	1375	055F	Unsigned 16	2
	Cap calibrations	8	1376	0560	Unsigned 16	2
	Cap sterilizations	1	1345	0541	Unsigned 8	1
	Cap sterilizations	2	1346	0542	Unsigned 8	1
	Cap sterilizations	3	1347	0543	Unsigned 8	1
	Cap sterilizations	4	1348	0544	Unsigned 8	1
	Cap sterilizations	5	1349	0545	Unsigned 8	1
	Cap sterilizations	6	1350	0546	Unsigned 8	1
	Cap sterilizations	7	1351	0547	Unsigned 8	1
	Cap sterilizations	8	1352	0548	Unsigned 8	1
	Charge	1	1353	0549	Float	5
	Charge	2	1354	054A	Float	5
	Charge	3	1355	054B	Float	5
	Charge	4	1356	054C	Float	5
	Charge	5	1357	054D	Float	5
	Charge	6	1358	054E	Float	5
	Charge	7	1359	054F	Float	5
	Charge	8	1360	0550	Float	5
	CIP cycles	1	1401	0579	Unsigned 16	2
	CIP cycles	2	1402	057A	Unsigned 16	2
	CIP cycles	3	1403	057B	Unsigned 16	2
	CIP cycles	4	1404	057C	Unsigned 16	2
	CIP cycles	5	1405	057D	Unsigned 16	2
	CIP cycles	6	1406	057E	Unsigned 16	2
	CIP cycles	7	1407	057F	Unsigned 16	2
	CIP cycles	8	1408	0580	Unsigned 16	2
	Filter changed	1	1361	0551	Float	5
	Filter changed	2	1362	0552	Float	5
	Filter changed	3	1363	0553	Float	5
	Filter changed	4	1364	0554	Float	5
	Filter changed	5	1365	0555	Float	5
	Filter changed	6	1366	0556	Float	5
	Filter changed	7	1367	0557	Float	5
	Filter changed	8	1368	0558	Float	5
	Lamp life	1	1393	0571	Float	5
	Lamp life	2	1394	0572	Float	5
	Lamp life	3	1395	0573	Float	5
	Lamp life	4	1396	0574	Float	5
	Lamp life	5	1397	0575	Float	5
	Lamp life	6	1398	0576	Float	5
	Lamp life	7	1399	0577	Float	5
	Lamp life	8	1400	0578	Float	5
	Specific 0	1	1265	04F1	Float	5
	Specific 0	2	1266	04F2	Float	5
	Specific 0	3	1267	04F3	Float	5
	Specific 0	4	1268	04F4	Float	5
	Specific 0	5	1269	04F5	Float	5
	Specific 0	6	1270	04F6	Float	5
	Specific 0	7	1271	04F7	Float	5
	Specific 0	8	1272	04F8	Float	5
	Specific 1	1	1257	04E9	Float	5
	Specific 1	2	1258	04EA	Float	5
	Specific 1	3	1259	04EB	Float	5
	Specific 1	4	1260	04EC	Float	5
	Specific 1	5	1261	04ED	Float	5
	Specific 1	6	1262	04EE	Float	5
	Specific 1	7	1263	04EF	Float	5
	Specific 1	8	1264	04F0	Float	5
	Specific 2	1	1281	0501	Float	5
	Specific 2	2	1282	0502	Float	5
	Specific 2	3	1283	0503	Float	5
	Specific 2	4	1284	0504	Float	5
	Specific 2	5	1285	0505	Float	5
	Specific 2	6	1286	0506	Float	5
	Specific 2	7	1287	0507	Float	5
	Specific 2	8	1288	0508	Float	5
	Specific 3	1	1273	04F9	Float	5
	Specific 3	2	1274	04FA	Float	5
	Specific 3	3	1275	04FB	Float	5
	Specific 3	4	1276	04FC	Float	5
	Specific 3	5	1277	04FD	Float	5
	Specific 3	6	1278	04FE	Float	5

Menu label	Parameter	Channel	ID	ID Hex	Type	Size
	Specific 3	7	1279	04FF	Float	5
	Specific 3	8	1280	0500	Float	5
	Specific 4	1	1297	0511	Float	5
	Specific 4	2	1298	0512	Float	5
	Specific 4	3	1299	0513	Float	5
	Specific 4	4	1300	0514	Float	5
	Specific 4	5	1301	0515	Float	5
	Specific 4	6	1302	0516	Float	5
	Specific 4	7	1303	0517	Float	5
	Specific 4	8	1304	0518	Float	5
	Specific 5	1	1289	0509	Float	5
	Specific 5	2	1290	050A	Float	5
	Specific 5	3	1291	050B	Float	5
	Specific 5	4	1292	050C	Float	5
	Specific 5	5	1293	050D	Float	5
	Specific 5	6	1294	050E	Float	5
	Specific 5	7	1295	050F	Float	5
	Specific 5	8	1296	0510	Float	5
	Specific 6	1	1313	0521	Float	5
	Specific 6	2	1314	0522	Float	5
	Specific 6	3	1315	0523	Float	5
	Specific 6	4	1316	0524	Float	5
	Specific 6	5	1317	0525	Float	5
	Specific 6	6	1318	0526	Float	5
	Specific 6	7	1319	0527	Float	5
	Specific 6	8	1320	0528	Float	5
	Specific 7	1	1305	0519	Float	5
	Specific 7	2	1306	051A	Float	5
	Specific 7	3	1307	051B	Float	5
	Specific 7	4	1308	051C	Float	5
	Specific 7	5	1309	051D	Float	5
	Specific 7	6	1310	051E	Float	5
	Specific 7	7	1311	051F	Float	5
	Specific 7	8	1312	0520	Float	5
	Specific 8	1	1329	0531	Float	5
	Specific 8	2	1330	0532	Float	5
	Specific 8	3	1331	0533	Float	5
	Specific 8	4	1332	0534	Float	5
	Specific 8	5	1333	0535	Float	5
	Specific 8	6	1334	0536	Float	5
	Specific 8	7	1335	0537	Float	5
	Specific 8	8	1336	0538	Float	5
	Specific 9	1	1321	0529	Float	5
	Specific 9	2	1322	052A	Float	5
	Specific 9	3	1323	052B	Float	5
	Specific 9	4	1324	052C	Float	5
	Specific 9	5	1325	052D	Float	5
	Specific 9	6	1326	052E	Float	5
	Specific 9	7	1327	052F	Float	5
	Specific 9	8	1328	0530	Float	5
	Sterilizations	1	1377	0561	Unsigned 16	2
	Sterilizations	2	1378	0562	Unsigned 16	2
	Sterilizations	3	1379	0563	Unsigned 16	2
	Sterilizations	4	1380	0564	Unsigned 16	2
	Sterilizations	5	1381	0565	Unsigned 16	2
	Sterilizations	6	1382	0566	Unsigned 16	2
	Sterilizations	7	1383	0567	Unsigned 16	2
	Sterilizations	8	1384	0568	Unsigned 16	2
	Total	1	1337	0539	Float	5
	Total	2	1338	053A	Float	5
	Total	3	1339	053B	Float	5
	Total	4	1340	053C	Float	5
	Total	5	1341	053D	Float	5
	Total	6	1342	053E	Float	5
	Total	7	1343	053F	Float	5
	Total	8	1344	0540	Float	5
Sensor specifications						
	Cell constant	1	1425	0591	Float	5
	Cell constant	2	1426	0592	Float	5
	Cell constant	3	1427	0593	Float	5
	Cell constant	4	1428	0594	Float	5
	Cell constant	5	1429	0595	Float	5
	Cell constant	6	1430	0596	Float	5
	Cell constant	7	1431	0597	Float	5

Menu label	Parameter	Channel	ID	ID Hex	Type	Size
	Cell constant	8	1432	0598	Float	5
	Measurement value max. 0	1	1225	04C9	Float	5
	Measurement value max. 0	2	1226	04CA	Float	5
	Measurement value max. 0	3	1227	04CB	Float	5
	Measurement value max. 0	4	1228	04CC	Float	5
	Measurement value max. 0	5	1229	04CD	Float	5
	Measurement value max. 0	6	1230	04CE	Float	5
	Measurement value max. 0	7	1231	04CF	Float	5
	Measurement value max. 0	8	1232	04D0	Float	5
	Measurement value max. 1	1	1217	04C1	Float	5
	Measurement value max. 1	2	1218	04C2	Float	5
	Measurement value max. 1	3	1219	04C3	Float	5
	Measurement value max. 1	4	1220	04C4	Float	5
	Measurement value max. 1	5	1221	04C5	Float	5
	Measurement value max. 1	6	1222	04C6	Float	5
	Measurement value max. 1	7	1223	04C7	Float	5
	Measurement value max. 1	8	1224	04C8	Float	5
	Measurement value max. 2	1	1209	04B9	Float	5
	Measurement value max. 2	2	1210	04BA	Float	5
	Measurement value max. 2	3	1211	04BB	Float	5
	Measurement value max. 2	4	1212	04BC	Float	5
	Measurement value max. 2	5	1213	04BD	Float	5
	Measurement value max. 2	6	1214	04BE	Float	5
	Measurement value max. 2	7	1215	04BF	Float	5
	Measurement value max. 2	8	1216	04C0	Float	5
	Measurement value max. 3	1	1201	04B1	Float	5
	Measurement value max. 3	2	1202	04B2	Float	5
	Measurement value max. 3	3	1203	04B3	Float	5
	Measurement value max. 3	4	1204	04B4	Float	5
	Measurement value max. 3	5	1205	04B5	Float	5
	Measurement value max. 3	6	1206	04B6	Float	5
	Measurement value max. 3	7	1207	04B7	Float	5
	Measurement value max. 3	8	1208	04B8	Float	5
	Measurement value min. 0	1	1145	0479	Float	5
	Measurement value min. 0	2	1146	047A	Float	5
	Measurement value min. 0	3	1147	047B	Float	5
	Measurement value min. 0	4	1148	047C	Float	5
	Measurement value min. 0	5	1149	047D	Float	5
	Measurement value min. 0	6	1150	047E	Float	5
	Measurement value min. 0	7	1151	047F	Float	5
	Measurement value min. 0	8	1152	0480	Float	5
	Measurement value min. 1	1	1137	0471	Float	5
	Measurement value min. 1	2	1138	0472	Float	5
	Measurement value min. 1	3	1139	0473	Float	5
	Measurement value min. 1	4	1140	0474	Float	5
	Measurement value min. 1	5	1141	0475	Float	5
	Measurement value min. 1	6	1142	0476	Float	5
	Measurement value min. 1	7	1143	0477	Float	5
	Measurement value min. 1	8	1144	0478	Float	5
	Measurement value min. 2	1	1161	0489	Float	5
	Measurement value min. 2	2	1162	048A	Float	5
	Measurement value min. 2	3	1163	048B	Float	5
	Measurement value min. 2	4	1164	048C	Float	5
	Measurement value min. 2	5	1165	048D	Float	5
	Measurement value min. 2	6	1166	048E	Float	5
	Measurement value min. 2	7	1167	048F	Float	5
	Measurement value min. 2	8	1168	0490	Float	5
	Measurement value min. 3	1	1153	0481	Float	5
	Measurement value min. 3	2	1154	0482	Float	5
	Measurement value min. 3	3	1155	0483	Float	5
	Measurement value min. 3	4	1156	0484	Float	5
	Measurement value min. 3	5	1157	0485	Float	5
	Measurement value min. 3	6	1158	0486	Float	5
	Measurement value min. 3	7	1159	0487	Float	5
	Measurement value min. 3	8	1160	0488	Float	5
	Pressure	1	1417	0589	Float	5
	Pressure	2	1418	058A	Float	5
	Pressure	3	1419	058B	Float	5
	Pressure	4	1420	058C	Float	5
	Pressure	5	1421	058D	Float	5
	Pressure	6	1422	058E	Float	5
	Pressure	7	1423	058F	Float	5
	Pressure	8	1424	0590	Float	5
	Temperature value max.	1	1121	0461	Float	5
	Temperature value max.	2	1122	0462	Float	5
	Temperature value max.	3	1123	0463	Float	5

Menu label	Parameter	Channel	ID	ID Hex	Type	Size
	Temperature value max.	4	1124	0464	Float	5
	Temperature value max.	5	1125	0465	Float	5
	Temperature value max.	6	1126	0466	Float	5
	Temperature value max.	7	1127	0467	Float	5
	Temperature value max.	8	1128	0468	Float	5
	Temperature value min.	1	1113	0459	Float	5
	Temperature value min.	2	1114	045A	Float	5
	Temperature value min.	3	1115	045B	Float	5
	Temperature value min.	4	1116	045C	Float	5
	Temperature value min.	5	1117	045D	Float	5
	Temperature value min.	6	1118	045E	Float	5
	Temperature value min.	7	1119	045F	Float	5
	Temperature value min.	8	1120	0460	Float	5
Sensor calibration information						
	Assay count	1	1801	0709	Unsigned 8	1
	Assay count	2	1802	070A	Unsigned 8	1
	Assay count	3	1803	070B	Unsigned 8	1
	Assay count	4	1804	070C	Unsigned 8	1
	Assay count	5	1805	070D	Unsigned 8	1
	Assay count	6	1806	070E	Unsigned 8	1
	Assay count	7	1807	070F	Unsigned 8	1
	Assay count	8	1808	0710	Unsigned 8	1
	Cell constant	1	1545	0609	Float	5
	Cell constant	2	1546	060A	Float	5
	Cell constant	3	1547	060B	Float	5
	Cell constant	4	1548	060C	Float	5
	Cell constant	5	1549	060D	Float	5
	Cell constant	6	1550	060E	Float	5
	Cell constant	7	1551	060F	Float	5
	Cell constant	8	1552	0610	Float	5
	COD factor	1	1809	0711	Float	5
	COD factor	2	1810	0712	Float	5
	COD factor	3	1811	0713	Float	5
	COD factor	4	1812	0714	Float	5
	COD factor	5	1813	0715	Float	5
	COD factor	6	1814	0716	Float	5
	COD factor	7	1815	0717	Float	5
	COD factor	8	1816	0718	Float	5
	Dataset name	1	1561	0619	String	33
	Dataset name	2	1562	061A	String	33
	Dataset name	3	1563	061B	String	33
	Dataset name	4	1564	061C	String	33
	Dataset name	5	1565	061D	String	33
	Dataset name	6	1566	061E	String	33
	Dataset name	7	1567	061F	String	33
	Dataset name	8	1568	0620	String	33
	Dataset ref. name	1	1633	0661	String	33
	Dataset ref. name	2	1634	0662	String	33
	Dataset ref. name	3	1635	0663	String	33
	Dataset ref. name	4	1636	0664	String	33
	Dataset ref. name	5	1637	0665	String	33
	Dataset ref. name	6	1638	0666	String	33
	Dataset ref. name	7	1639	0667	String	33
	Dataset ref. name	8	1640	0668	String	33
	Dataset unit	1	1617	0651	Enum	1
	Dataset unit	2	1618	0652	Enum	1
	Dataset unit	3	1619	0653	Enum	1
	Dataset unit	4	1620	0654	Enum	1
	Dataset unit	5	1621	0655	Enum	1
	Dataset unit	6	1622	0656	Enum	1
	Dataset unit	7	1623	0657	Enum	1
	Dataset unit	8	1624	0658	Enum	1
	Isothermal mV	1	1625	0659	Float	5
	Isothermal mV	2	1626	065A	Float	5
	Isothermal mV	3	1627	065B	Float	5
	Isothermal mV	4	1628	065C	Float	5
	Isothermal mV	5	1629	065D	Float	5
	Isothermal mV	6	1630	065E	Float	5
	Isothermal mV	7	1631	065F	Float	5
	Isothermal mV	8	1632	0660	Float	5
	Isothermal pH	1	1649	0671	Float	5
	Isothermal pH	2	1650	0672	Float	5
	Isothermal pH	3	1651	0673	Float	5
	Isothermal pH	4	1652	0674	Float	5

Menu label	Parameter	Channel	ID	ID Hex	Type	Size
	Isothermal pH	5	1653	0675	Float	5
	Isothermal pH	6	1654	0676	Float	5
	Isothermal pH	7	1655	0677	Float	5
	Isothermal pH	8	1656	0678	Float	5
	Offset	1	1657	0679	Float	5
	Offset	2	1658	067A	Float	5
	Offset	3	1659	067B	Float	5
	Offset	4	1660	067C	Float	5
	Offset	5	1661	067D	Float	5
	Offset	6	1662	067E	Float	5
	Offset	7	1663	067F	Float	5
	Offset	8	1664	0680	Float	5
	Operation point	1	1521	05F1	Float	5
	Operation point	2	1522	05F2	Float	5
	Operation point	3	1523	05F3	Float	5
	Operation point	4	1524	05F4	Float	5
	Operation point	5	1525	05F5	Float	5
	Operation point	6	1526	05F6	Float	5
	Operation point	7	1527	05F7	Float	5
	Operation point	8	1528	05F8	Float	5
	TOC factor	1	1705	06A9	Float	5
	TOC factor	2	1706	06AA	Float	5
	TOC factor	3	1707	06AB	Float	5
	TOC factor	4	1708	06AC	Float	5
	TOC factor	5	1709	06AD	Float	5
	TOC factor	6	1710	06AE	Float	5
	TOC factor	7	1711	06AF	Float	5
	TOC factor	8	1712	06B0	Float	5
	Transmitter ID	1	1481	05C9	Unsigned 16	2
	Transmitter ID	2	1482	05CA	Unsigned 16	2
	Transmitter ID	3	1483	05CB	Unsigned 16	2
	Transmitter ID	4	1484	05CC	Unsigned 16	2
	Transmitter ID	5	1485	05CD	Unsigned 16	2
	Transmitter ID	6	1486	05CE	Unsigned 16	2
	Transmitter ID	7	1487	05CF	Unsigned 16	2
	Transmitter ID	8	1488	05D0	Unsigned 16	2
Sensor temperature calibration						
	Count	1	1681	0691	Unsigned 16	2
	Count	2	1682	0692	Unsigned 16	2
	Count	3	1683	0693	Unsigned 16	2
	Count	4	1684	0694	Unsigned 16	2
	Count	5	1685	0695	Unsigned 16	2
	Count	6	1686	0696	Unsigned 16	2
	Count	7	1687	0697	Unsigned 16	2
	Count	8	1688	0698	Unsigned 16	2
	Date Time	1	1641	0669	Date	7
	Date Time	2	1642	066A	Date	7
	Date Time	3	1643	066B	Date	7
	Date Time	4	1644	066C	Date	7
	Date Time	5	1645	066D	Date	7
	Date Time	6	1646	066E	Date	7
	Date Time	7	1647	066F	Date	7
	Date Time	8	1648	0670	Date	7
	Method	1	1537	0601	Enum	1
	Method	2	1538	0602	Enum	1
	Method	3	1539	0603	Enum	1
	Method	4	1540	0604	Enum	1
	Method	5	1541	0605	Enum	1
	Method	6	1542	0606	Enum	1
	Method	7	1543	0607	Enum	1
	Method	8	1544	0608	Enum	1
	Offset	1	1721	06B9	Float	5
	Offset	2	1722	06BA	Float	5
	Offset	3	1723	06BB	Float	5
	Offset	4	1724	06BC	Float	5
	Offset	5	1725	06BD	Float	5
	Offset	6	1726	06BE	Float	5
	Offset	7	1727	06BF	Float	5
	Offset	8	1728	06C0	Float	5
	Ref. value 1	1	1569	0621	Float	5
	Ref. value 1	2	1570	0622	Float	5
	Ref. value 1	3	1571	0623	Float	5
	Ref. value 1	4	1572	0624	Float	5
	Ref. value 1	5	1573	0625	Float	5

Menu label	Parameter	Channel	ID	ID Hex	Type	Size
	Ref. value 1	6	1574	0626	Float	5
	Ref. value 1	7	1575	0627	Float	5
	Ref. value 1	8	1576	0628	Float	5
	Ref. value 2	1	1577	0629	Float	5
	Ref. value 2	2	1578	062A	Float	5
	Ref. value 2	3	1579	062B	Float	5
	Ref. value 2	4	1580	062C	Float	5
	Ref. value 2	5	1581	062D	Float	5
	Ref. value 2	6	1582	062E	Float	5
	Ref. value 2	7	1583	062F	Float	5
	Ref. value 2	8	1584	0630	Float	5
	Slope	1	1489	05D1	Float	5
	Slope	2	1490	05D2	Float	5
	Slope	3	1491	05D3	Float	5
	Slope	4	1492	05D4	Float	5
	Slope	5	1493	05D5	Float	5
	Slope	6	1494	05D6	Float	5
	Slope	7	1495	05D7	Float	5
	Slope	8	1496	05D8	Float	5
	Transmitter ID	1	1465	05B9	Unsigned 16	2
	Transmitter ID	2	1466	05BA	Unsigned 16	2
	Transmitter ID	3	1467	05BB	Unsigned 16	2
	Transmitter ID	4	1468	05BC	Unsigned 16	2
	Transmitter ID	5	1469	05BD	Unsigned 16	2
	Transmitter ID	6	1470	05BE	Unsigned 16	2
	Transmitter ID	7	1471	05BF	Unsigned 16	2
	Transmitter ID	8	1472	05C0	Unsigned 16	2
	Transmitter serial	1	1593	0639	String	33
	Transmitter serial	2	1594	063A	String	33
	Transmitter serial	3	1595	063B	String	33
	Transmitter serial	4	1596	063C	String	33
	Transmitter serial	5	1597	063D	String	33
	Transmitter serial	6	1598	063E	String	33
	Transmitter serial	7	1599	063F	String	33
	Transmitter serial	8	1600	0640	String	33
Sensor zero calibration						
	Count	1	1729	06C1	Unsigned 16	2
	Count	2	1730	06C2	Unsigned 16	2
	Count	3	1731	06C3	Unsigned 16	2
	Count	4	1732	06C4	Unsigned 16	2
	Count	5	1733	06C5	Unsigned 16	2
	Count	6	1734	06C6	Unsigned 16	2
	Count	7	1735	06C7	Unsigned 16	2
	Count	8	1736	06C8	Unsigned 16	2
	Date time	1	1505	05E1	Date	7
	Date time	2	1506	05E2	Date	7
	Date time	3	1507	05E3	Date	7
	Date time	4	1508	05E4	Date	7
	Date time	5	1509	05E5	Date	7
	Date time	6	1510	05E6	Date	7
	Date time	7	1511	05E7	Date	7
	Date time	8	1512	05E8	Date	7
	Delta zero	1	1457	05B1	Float	5
	Delta zero	2	1458	05B2	Float	5
	Delta zero	3	1459	05B3	Float	5
	Delta zero	4	1460	05B4	Float	5
	Delta zero	5	1461	05B5	Float	5
	Delta zero	6	1462	05B6	Float	5
	Delta zero	7	1463	05B7	Float	5
	Delta zero	8	1464	05B8	Float	5
	Method	1	1585	0631	Enum	1
	Method	2	1586	0632	Enum	1
	Method	3	1587	0633	Enum	1
	Method	4	1588	0634	Enum	1
	Method	5	1589	0635	Enum	1
	Method	6	1590	0636	Enum	1
	Method	7	1591	0637	Enum	1
	Method	8	1592	0638	Enum	1
	Tau	1	1697	06A1	Float	5
	Tau	2	1698	06A2	Float	5
	Tau	3	1699	06A3	Float	5
	Tau	4	1700	06A4	Float	5
	Tau	5	1701	06A5	Float	5
	Tau	6	1702	06A6	Float	5

Menu label	Parameter	Channel	ID	ID Hex	Type	Size
	Tau	7	1703	06A7	Float	5
	Tau	8	1704	06A8	Float	5
	Transmitter serial	1	1745	06D1	String	33
	Transmitter serial	2	1746	06D2	String	33
	Transmitter serial	3	1747	06D3	String	33
	Transmitter serial	4	1748	06D4	String	33
	Transmitter serial	5	1749	06D5	String	33
	Transmitter serial	6	1750	06D6	String	33
	Transmitter serial	7	1751	06D7	String	33
	Transmitter serial	8	1752	06D8	String	33
	Zero	1	1673	0689	Float	5
	Zero	2	1674	068A	Float	5
	Zero	3	1675	068B	Float	5
	Zero	4	1676	068C	Float	5
	Zero	5	1677	068D	Float	5
	Zero	6	1678	068E	Float	5
	Zero	7	1679	068F	Float	5
	Zero	8	1680	0690	Float	5
	Delta cell constant	1	1473	05C1	Float	5
	Cell constant	2	1474	05C2	Float	5
	Cell constant	3	1475	05C3	Float	5
	Cell constant	4	1476	05C4	Float	5
	Cell constant	5	1477	05C5	Float	5
	Cell constant	6	1478	05C6	Float	5
	Cell constant	7	1479	05C7	Float	5
	Cell constant	8	1480	05C8	Float	5
	Offset	1	1777	06F1	Float	5
	Offset	2	1778	06F2	Float	5
	Offset	3	1779	06F3	Float	5
	Offset	4	1780	06F4	Float	5
	Offset	5	1781	06F5	Float	5
	Offset	6	1782	06F6	Float	5
	Offset	7	1783	06F7	Float	5
	Offset	8	1784	06F8	Float	5
	Setpoint	1	1529	05F9	Float	5
	Setpoint	2	1530	05FA	Float	5
	Setpoint	3	1531	05FB	Float	5
	Setpoint	4	1532	05FC	Float	5
	Setpoint	5	1533	05FD	Float	5
	Setpoint	6	1534	05FE	Float	5
	Setpoint	7	1535	05FF	Float	5
	Setpoint	8	1536	0600	Float	5
Hardware information						
	Temperature		1048	0418	Float	5
	Voltage 12.5V		1047	0417	Float	5
	Voltage 1.2V		1044	0414	Float	5
	Voltage 24V		1046	0416	Float	5
	Voltage 3.3V		1045	0415	Float	5
	Base module description		1920	0780	String	33
	Base module hardware version		1957	07A5	String	17
	Base module order code		1878	0756	String	33
	Base module part number		1939	0793	Unsigned 32	4
	Base module serial number		1929	0789	String	33
	Base module software version		1954	07A2	String	17
	Base module visibility		1918	077E	Boolean	1
	CPU description		1875	0753	String	33
	CPU hardware version		1886	075E	String	17
	CPU order code		1942	0796	String	33
	CPU part number		1894	0766	Unsigned 32	4
	CPU serial number		1871	074F	String	33
	CPU software version		1852	073C	String	17
	CPU visibility		1853	073D	Boolean	1
	Display module description		1945	0799	String	33
	Display module hardware version		1834	072A	String	17
	Display module order code		1960	07A8	String	33
	Display module part number		1934	078E	Unsigned 32	4
	Display module serial number		1895	0767	String	33
	Display module software version		1884	075C	String	17
	Display module visibility		1865	0749	Boolean	1
	Extension module 1 description		1856	0740	String	33
	Extension module 1 hardware version		1902	076E	String	17
	Extension module 1 order code		1830	0726	String	33
	Extension module 1 part number		1817	0719	Unsigned 32	4
	Extension module 1 serial number		1937	0791	String	33

Menu label	Parameter	Channel	ID	ID Hex	Type	Size
	Extension module 1 software version		1947	079B	String	17
	Extension module 1 visibility		1826	0722	Boolean	1
	Extension module 2 description		1821	071D	String	33
	Extension module 2 hardware version		1907	0773	String	17
	Extension module 2 order code		1839	072F	String	33
	Extension module 2 part number		1950	079E	Unsigned 32	4
	Extension module 2 serial number		1858	0742	String	33
	Extension module 2 software version		1835	072B	String	17
	Extension module 2 visibility		1958	07A6	Boolean	1
	Extension module 3 description		1819	071B	String	33
	Extension module 3 hardware version		1908	0774	String	17
	Extension module 3 order code		1900	076C	String	33
	Extension module 3 part number		1904	0770	Unsigned 32	4
	Extension module 3 serial number		1866	074A	String	33
	Extension module 3 software version		1861	0745	String	17
	Extension module 3 visibility		1962	07AA	Boolean	1
	Extension module 4 description		1828	0724	String	33
	Extension module 4 hardware version		1919	077F	String	17
	Extension module 4 order code		1848	0738	String	33
	Extension module 4 part number		1859	0743	Unsigned 32	4
	Extension module 4 serial number		1932	078C	String	33
	Extension module 4 software version		1829	0725	String	17
	Extension module 4 visibility		1888	0760	Boolean	1
	Extension module 5 description		1882	075A	String	33
	Extension module 5 hardware version		1893	0765	String	17
	Extension module 5 order code		1869	074D	String	33
	Extension module 5 part number		1931	078B	Unsigned 32	4
	Extension module 5 serial number		1946	079A	String	33
	Extension module 5 software version		1860	0744	String	17
	Extension module 5 visibility		1840	0730	Boolean	1
	Extension module 6 description		1940	0794	String	33
	Extension module 6 hardware version		1850	073A	String	17
	Extension module 6 order code		1928	0788	String	33
	Extension module 6 part number		1851	073B	Unsigned 32	4
	Extension module 6 serial number		1951	079F	String	33
	Extension module 6 software version		1857	0741	String	17
	Extension module 6 visibility		1922	0782	Boolean	1
	Extension module 7 description		1911	0777	String	33
	Extension module 7 hardware version		1822	071E	String	17
	Extension module 7 order code		1873	0751	String	33
	Extension module 7 part number		1912	0778	Unsigned 32	4
	Extension module 7 serial number		1842	0732	String	33
	Extension module 7 software version		1843	0733	String	17
	Extension module 7 visibility		1837	072D	Boolean	1
	Extension module 8 description		1933	078D	String	33
	Extension module 8 hardware version		1926	0786	String	17
	Extension module 8 order code		1877	0755	String	33
	Extension module 8 part number		1827	0723	Unsigned 32	4
	Extension module 8 serial number		1846	0736	String	33
	Extension module 8 software version		1838	072E	String	17
	Extension module 8 visibility		1923	0783	Boolean	1
	FMSY1 description		1874	0752	String	33
	FMSY1 hardware version		1909	0775	String	17
	FMSY1 order code		1831	0727	String	33
	FMSY1 part number		1892	0764	Unsigned 32	4
	FMSY1 serial number		1944	0798	String	33
	FMSY1 software version		1930	078A	String	17
	FMSY1 visibility		1905	0771	Boolean	1
	Power supply description		1825	0721	String	33
	Power supply hardware version		1824	0720	String	17
	Power supply order code		1927	0787	String	33
	Power supply part number		1913	0779	Unsigned 32	4
	Power supply serial number		1917	077D	String	33
	Power supply software version		1949	079D	String	17
	Power supply visibility		1872	0750	Boolean	1
	Sensor 1 description		1901	076D	String	33
	Sensor 1 hardware version		1836	072C	String	17
	Sensor 1 order code		1862	0746	String	33
	Sensor 1 part number		1849	0739	Unsigned 32	4
	Sensor 1 serial number		1899	076B	String	33
	Sensor 1 software version		1818	071A	String	17
	Sensor 1 visibility		1891	0763	Boolean	1
	Sensor 2 description		1953	07A1	String	33
	Sensor 2 hardware version		1936	0790	String	17
	Sensor 2 order code		1924	0784	String	33
	Sensor 2 part number		1833	0729	Unsigned 32	4

Menu label	Parameter	Channel	ID	ID Hex	Type	Size
	Sensor 2 serial number		1847	0737	String	33
	Sensor 2 software version		1952	07A0	String	17
	Sensor 2 visibility		1897	0769	Boolean	1
	Sensor 3 description		1921	0781	String	33
	Sensor 3 hardware version		1941	0795	String	17
	Sensor 3 order code		1961	07A9	String	33
	Sensor 3 part number		1854	073E	Unsigned 32	4
	Sensor 3 serial number		1868	074C	String	33
	Sensor 3 software version		1879	0757	String	17
	Sensor 3 visibility		1948	079C	Boolean	1
	Sensor 4 description		1832	0728	String	33
	Sensor 4 hardware version		1896	0768	String	17
	Sensor 4 order code		1963	07AB	String	33
	Sensor 4 part number		1870	074E	Unsigned 32	4
	Sensor 4 serial number		1898	076A	String	33
	Sensor 4 software version		1867	074B	String	17
	Sensor 4 visibility		1956	07A4	Boolean	1
	Sensor 5 description		1876	0754	String	33
	Sensor 5 hardware version		1903	076F	String	17
	Sensor 5 order code		1959	07A7	String	33
	Sensor 5 part number		1889	0761	Unsigned 32	4
	Sensor 5 serial number		1855	073F	String	33
	Sensor 5 software version		1943	0797	String	17
	Sensor 5 visibility		1881	0759	Boolean	1
	Sensor 6 description		1915	077B	String	33
	Sensor 6 hardware version		1820	071C	String	17
	Sensor 6 order code		1880	0758	String	33
	Sensor 6 part number		1841	0731	Unsigned 32	4
	Sensor 6 serial number		1883	075B	String	33
	Sensor 6 software version		1925	0785	String	17
	Sensor 6 visibility		1935	078F	Boolean	1
	Sensor 7 description		1910	0776	String	33
	Sensor 7 hardware version		1844	0734	String	17
	Sensor 7 order code		1890	0762	String	33
	Sensor 7 part number		1914	077A	Unsigned 32	4
	Sensor 7 serial number		1887	075F	String	33
	Sensor 7 software version		1823	071F	String	17
	Sensor 7 visibility		1885	075D	Boolean	1
	Sensor 8 description		1863	0747	String	33
	Sensor 8 hardware version		1916	077C	String	17
	Sensor 8 order code		1845	0735	String	33
	Sensor 8 part number		1906	0772	Unsigned 32	4
	Sensor 8 serial number		1955	07A3	String	33
	Sensor 8 software version		1864	0748	String	17
	Sensor 8 visibility		1938	0792	Boolean	1
	Sampler firmware version		2081	0821	String	17
	Sampler projecting version		2080	0820	Signed 32	4
HART communication statistics						
	BCC errors		2015	07DF	Unsigned 32	4
	Busies		2016	07E0	Unsigned 32	4
	Framing errors		2012	07DC	Unsigned 32	4
	Parity errors		2011	07DB	Unsigned 32	4
	Invalid frames		2014	07DE	Unsigned 32	4
	Valid frames		2013	07DD	Unsigned 32	4

11.2. Parameter ID's Heartbeat / device and sensor health

Parameter and channel	ID	ID Hex	Type	Length
Device Heartbeat				
ChecksSumVerdict	3989	0F95	EHeartbeatSumVerdict	1
DeviceCounterAvailability	4253	109D	Float	5
DeviceCounterMeanTimeBetweenFailures	4539	11BB	Date	7
DeviceCounterMeanTimeToRepair	4521	11A9	Date	7
DeviceCounterNumberOfFailures	4314	10DA	Unsigned 16	2
DeviceCounterOperatingTime	4495	118F	Date	7
DeviceCounterOperatingTimeTotal	4496	1190	Date	7
DeviceCounterTimeInFailure	4538	11BA	Date	7
DeviceHealth	4187	105B	Float	5
DeviceState	3867	0F1B	EHeartbeatSensorStatus	1
Device Info				
DeviceSerialNumber	463	01CF	String	33
DeviceSoftwareVersion	512	0200	String	17
DeviceTag	15	000F	String	33
Sensor Heartbeat				
HeartbeatCounterAvailability.CH0	4548	11C4	Float	5
HeartbeatCounterAvailability.CH1	4549	11C5	Float	5
HeartbeatCounterAvailability.CH2	4550	11C6	Float	5
HeartbeatCounterAvailability.CH3	4551	11C7	Float	5
HeartbeatCounterAvailability.CH4	4552	11C8	Float	5
HeartbeatCounterAvailability.CH5	4553	11C9	Float	5
HeartbeatCounterAvailability.CH6	4554	11CA	Float	5
HeartbeatCounterAvailability.CH7	4555	11CB	Float	5
HeartbeatCounterMeanTimeBetweenCalibrations.CH0	4530	11B2	Date	7
HeartbeatCounterMeanTimeBetweenCalibrations.CH1	4531	11B3	Date	7
HeartbeatCounterMeanTimeBetweenCalibrations.CH2	4532	11B4	Date	7
HeartbeatCounterMeanTimeBetweenCalibrations.CH3	4533	11B5	Date	7
HeartbeatCounterMeanTimeBetweenCalibrations.CH4	4534	11B6	Date	7
HeartbeatCounterMeanTimeBetweenCalibrations.CH5	4535	11B7	Date	7
HeartbeatCounterMeanTimeBetweenCalibrations.CH6	4536	11B8	Date	7
HeartbeatCounterMeanTimeBetweenCalibrations.CH7	4537	11B9	Date	7
HeartbeatCounterMeanTimeBetweenFailures.CH0	4513	11A1	Date	7
HeartbeatCounterMeanTimeBetweenFailures.CH1	4514	11A2	Date	7
HeartbeatCounterMeanTimeBetweenFailures.CH2	4515	11A3	Date	7
HeartbeatCounterMeanTimeBetweenFailures.CH3	4516	11A4	Date	7
HeartbeatCounterMeanTimeBetweenFailures.CH4	4517	11A5	Date	7
HeartbeatCounterMeanTimeBetweenFailures.CH5	4518	11A6	Date	7
HeartbeatCounterMeanTimeBetweenFailures.CH6	4519	11A7	Date	7
HeartbeatCounterMeanTimeBetweenFailures.CH7	4520	11A8	Date	7
HeartbeatCounterMeanTimeToRepair.CH0	4505	1199	Date	7
HeartbeatCounterMeanTimeToRepair.CH1	4506	119A	Date	7
HeartbeatCounterMeanTimeToRepair.CH2	4507	119B	Date	7
HeartbeatCounterMeanTimeToRepair.CH3	4508	119C	Date	7
HeartbeatCounterMeanTimeToRepair.CH4	4509	119D	Date	7
HeartbeatCounterMeanTimeToRepair.CH5	4510	119E	Date	7
HeartbeatCounterMeanTimeToRepair.CH6	4511	119F	Date	7
HeartbeatCounterMeanTimeToRepair.CH7	4512	11A0	Date	7
HeartbeatCounterNumberOfCalibrations.CH0	4497	1191	Unsigned 16	2
HeartbeatCounterNumberOfCalibrations.CH1	4498	1192	Unsigned 16	2
HeartbeatCounterNumberOfCalibrations.CH2	4499	1193	Unsigned 16	2
HeartbeatCounterNumberOfCalibrations.CH3	4500	1194	Unsigned 16	2
HeartbeatCounterNumberOfCalibrations.CH4	4501	1195	Unsigned 16	2
HeartbeatCounterNumberOfCalibrations.CH5	4502	1196	Unsigned 16	2
HeartbeatCounterNumberOfCalibrations.CH6	4503	1197	Unsigned 16	2
HeartbeatCounterNumberOfCalibrations.CH7	4504	1198	Unsigned 16	2
HeartbeatCounterNumberOfFailures.CH0	4564	11D4	Unsigned 16	2
HeartbeatCounterNumberOfFailures.CH1	4565	11D5	Unsigned 16	2
HeartbeatCounterNumberOfFailures.CH2	4566	11D6	Unsigned 16	2
HeartbeatCounterNumberOfFailures.CH3	4567	11D7	Unsigned 16	2
HeartbeatCounterNumberOfFailures.CH4	4568	11D8	Unsigned 16	2
HeartbeatCounterNumberOfFailures.CH5	4569	11D9	Unsigned 16	2
HeartbeatCounterNumberOfFailures.CH6	4570	11DA	Unsigned 16	2
HeartbeatCounterNumberOfFailures.CH7	4571	11DB	Unsigned 16	2
HeartbeatCounterOperatingTime.CH0	4556	11CC	Date	7
HeartbeatCounterOperatingTime.CH1	4557	11CD	Date	7
HeartbeatCounterOperatingTime.CH2	4558	11CE	Date	7
HeartbeatCounterOperatingTime.CH3	4559	11CF	Date	7
HeartbeatCounterOperatingTime.CH4	4560	11D0	Date	7
HeartbeatCounterOperatingTime.CH5	4561	11D1	Date	7

Parameter and channel	ID	ID Hex	Type	Length
HeartbeatCounterOperatingTime.CH6	4562	11D2	Date	7
HeartbeatCounterOperatingTime.CH7	4563	11D3	Date	7
HeartbeatCounterTimeInCalibrations.CH0	4522	11AA	Date	7
HeartbeatCounterTimeInCalibrations.CH1	4523	11AB	Date	7
HeartbeatCounterTimeInCalibrations.CH2	4524	11AC	Date	7
HeartbeatCounterTimeInCalibrations.CH3	4525	11AD	Date	7
HeartbeatCounterTimeInCalibrations.CH4	4526	11AE	Date	7
HeartbeatCounterTimeInCalibrations.CH5	4527	11AF	Date	7
HeartbeatCounterTimeInCalibrations.CH6	4528	11B0	Date	7
HeartbeatCounterTimeInCalibrations.CH7	4529	11B1	Date	7
HeartbeatCounterTimeInFailure.CH0	4540	11BC	Date	7
HeartbeatCounterTimeInFailure.CH1	4541	11BD	Date	7
HeartbeatCounterTimeInFailure.CH2	4542	11BE	Date	7
HeartbeatCounterTimeInFailure.CH3	4543	11BF	Date	7
HeartbeatCounterTimeInFailure.CH4	4544	11C0	Date	7
HeartbeatCounterTimeInFailure.CH5	4545	11C1	Date	7
HeartbeatCounterTimeInFailure.CH6	4546	11C2	Date	7
HeartbeatCounterTimeInFailure.CH7	4547	11C3	Date	7
HeartbeatIndex.CH0	3396	0D44	Float	5
HeartbeatIndex.CH1	3397	0D45	Float	5
HeartbeatIndex.CH2	3398	0D46	Float	5
HeartbeatIndex.CH3	3399	0D47	Float	5
HeartbeatIndex.CH4	3400	0D48	Float	5
HeartbeatIndex.CH5	3401	0D49	Float	5
HeartbeatIndex.CH6	3402	0D4A	Float	5
HeartbeatIndex.CH7	3403	0D4B	Float	5
HeartbeatMaintenanceTimer.CH0	3380	0D34	Float	5
HeartbeatMaintenanceTimer.CH1	3381	0D35	Float	5
HeartbeatMaintenanceTimer.CH2	3382	0D36	Float	5
HeartbeatMaintenanceTimer.CH3	3383	0D37	Float	5
HeartbeatMaintenanceTimer.CH4	3384	0D38	Float	5
HeartbeatMaintenanceTimer.CH5	3385	0D39	Float	5
HeartbeatMaintenanceTimer.CH6	3386	0D3A	Float	5
HeartbeatMaintenanceTimer.CH7	3387	0D3B	Float	5
HeartbeatSensorHealth.CH0	3340	0D0C	Float	5
HeartbeatSensorHealth.CH1	3341	0D0D	Float	5
HeartbeatSensorHealth.CH2	3342	0D0E	Float	5
HeartbeatSensorHealth.CH3	3343	0D0F	Float	5
HeartbeatSensorHealth.CH4	3344	0D10	Float	5
HeartbeatSensorHealth.CH5	3345	0D11	Float	5
HeartbeatSensorHealth.CH6	3346	0D12	Float	5
HeartbeatSensorHealth.CH7	3347	0D13	Float	5
HeartbeatSensorStatus.CH0	3388	0D3C	Float	5
HeartbeatSensorStatus.CH1	3389	0D3D	Float	5
HeartbeatSensorStatus.CH2	3390	0D3E	Float	5
HeartbeatSensorStatus.CH3	3391	0D3F	Float	5
HeartbeatSensorStatus.CH4	3392	0D40	Float	5
HeartbeatSensorStatus.CH5	3393	0D41	Float	5
HeartbeatSensorStatus.CH6	3394	0D42	Float	5
HeartbeatSensorStatus.CH7	3395	0D43	Float	5
Sensor Info				
GInfo_SerialNumber.CH0	1193	04A9	String	17
GInfo_SerialNumber.CH1	1194	04AA	String	17
GInfo_SerialNumber.CH2	1195	04AB	String	17
GInfo_SerialNumber.CH3	1196	04AC	String	17
GInfo_SerialNumber.CH4	1197	04AD	String	17
GInfo_SerialNumber.CH5	1198	04AE	String	17
GInfo_SerialNumber.CH6	1199	04AF	String	17
GInfo_SerialNumber.CH7	1200	04B0	String	17
Global_CalibCounter.CH0	3743	0E9F	Unsigned 16	2
Global_CalibCounter.CH1	3744	0EA0	Unsigned 16	2
Global_CalibCounter.CH2	3745	0EA1	Unsigned 16	2
Global_CalibCounter.CH3	3746	0EA2	Unsigned 16	2
Global_CalibCounter.CH4	3747	0EA3	Unsigned 16	2
Global_CalibCounter.CH5	3748	0EA4	Unsigned 16	2
Global_CalibCounter.CH6	3749	0EA5	Unsigned 16	2
Global_CalibCounter.CH7	3750	0EA6	Unsigned 16	2
OpTime_AboveSpecTempMax.CH0	1385	0569	Float	5
OpTime_AboveSpecTempMax.CH1	1386	056A	Float	5
OpTime_AboveSpecTempMax.CH2	1387	056B	Float	5
OpTime_AboveSpecTempMax.CH3	1388	056C	Float	5
OpTime_AboveSpecTempMax.CH4	1389	056D	Float	5
OpTime_AboveSpecTempMax.CH5	1390	056E	Float	5
OpTime_AboveSpecTempMax.CH6	1391	056F	Float	5

Parameter and channel	ID	ID Hex	Type	Length
OpTime_AboveSpecTempMax.CH7	1392	0570	Float	5
OpTime_ActivationState.CH0	3244	0CAC	ESIActivationState	1
OpTime_ActivationState.CH1	3245	0CAD	ESIActivationState	1
OpTime_ActivationState.CH2	3246	0CAE	ESIActivationState	1
OpTime_ActivationState.CH3	3247	0CAF	ESIActivationState	1
OpTime_ActivationState.CH4	3248	0CB0	ESIActivationState	1
OpTime_ActivationState.CH5	3249	0CB1	ESIActivationState	1
OpTime_ActivationState.CH6	3250	0CB2	ESIActivationState	1
OpTime_ActivationState.CH7	3251	0CB3	ESIActivationState	1
OpTime_Autoclavings.CH0	3252	0CB4	Unsigned 16	2
OpTime_Autoclavings.CH1	3253	0CB5	Unsigned 16	2
OpTime_Autoclavings.CH2	3254	0CB6	Unsigned 16	2
OpTime_Autoclavings.CH3	3255	0CB7	Unsigned 16	2
OpTime_Autoclavings.CH4	3256	0CB8	Unsigned 16	2
OpTime_Autoclavings.CH5	3257	0CB9	Unsigned 16	2
OpTime_Autoclavings.CH6	3258	0CBA	Unsigned 16	2
OpTime_Autoclavings.CH7	3259	0CBB	Unsigned 16	2
OpTime_BelowSpecTempMin.CH0	1249	04E1	Float	5
OpTime_BelowSpecTempMin.CH1	1250	04E2	Float	5
OpTime_BelowSpecTempMin.CH2	1251	04E3	Float	5
OpTime_BelowSpecTempMin.CH3	1252	04E4	Float	5
OpTime_BelowSpecTempMin.CH4	1253	04E5	Float	5
OpTime_BelowSpecTempMin.CH5	1254	04E6	Float	5
OpTime_BelowSpecTempMin.CH6	1255	04E7	Float	5
OpTime_BelowSpecTempMin.CH7	1256	04E8	Float	5
OpTime_CIPCycles.CH0	1401	0579	Unsigned 16	2
OpTime_CIPCycles.CH1	1402	057A	Unsigned 16	2
OpTime_CIPCycles.CH2	1403	057B	Unsigned 16	2
OpTime_CIPCycles.CH3	1404	057C	Unsigned 16	2
OpTime_CIPCycles.CH4	1405	057D	Unsigned 16	2
OpTime_CIPCycles.CH5	1406	057E	Unsigned 16	2
OpTime_CIPCycles.CH6	1407	057F	Unsigned 16	2
OpTime_CIPCycles.CH7	1408	0580	Unsigned 16	2
OpTime_CalibTimer.CH0	1241	04D9	Float	5
OpTime_CalibTimer.CH1	1242	04DA	Float	5
OpTime_CalibTimer.CH2	1243	04DB	Float	5
OpTime_CalibTimer.CH3	1244	04DC	Float	5
OpTime_CalibTimer.CH4	1245	04DD	Float	5
OpTime_CalibTimer.CH5	1246	04DE	Float	5
OpTime_CalibTimer.CH6	1247	04DF	Float	5
OpTime_CalibTimer.CH7	1248	04E0	Float	5
OpTime_CapAutoclavings.CH0	3868	0F1C	Unsigned 16	2
OpTime_CapAutoclavings.CH1	3869	0F1D	Unsigned 16	2
OpTime_CapAutoclavings.CH2	3870	0F1E	Unsigned 16	2
OpTime_CapAutoclavings.CH3	3871	0F1F	Unsigned 16	2
OpTime_CapAutoclavings.CH4	3872	0F20	Unsigned 16	2
OpTime_CapAutoclavings.CH5	3873	0F21	Unsigned 16	2
OpTime_CapAutoclavings.CH6	3874	0F22	Unsigned 16	2
OpTime_CapAutoclavings.CH7	3875	0F23	Unsigned 16	2
OpTime_CapCIPCycles.CH0	3619	0E23	Unsigned 16	2
OpTime_CapCIPCycles.CH1	3620	0E24	Unsigned 16	2
OpTime_CapCIPCycles.CH2	3621	0E25	Unsigned 16	2
OpTime_CapCIPCycles.CH3	3622	0E26	Unsigned 16	2
OpTime_CapCIPCycles.CH4	3623	0E27	Unsigned 16	2
OpTime_CapCIPCycles.CH5	3624	0E28	Unsigned 16	2
OpTime_CapCIPCycles.CH6	3625	0E29	Unsigned 16	2
OpTime_CapCIPCycles.CH7	3626	0E2A	Unsigned 16	2
OpTime_CapCalibrations.CH0	1369	0559	Unsigned 16	2
OpTime_CapCalibrations.CH1	1370	055A	Unsigned 16	2
OpTime_CapCalibrations.CH2	1371	055B	Unsigned 16	2
OpTime_CapCalibrations.CH3	1372	055C	Unsigned 16	2
OpTime_CapCalibrations.CH4	1373	055D	Unsigned 16	2
OpTime_CapCalibrations.CH5	1374	055E	Unsigned 16	2
OpTime_CapCalibrations.CH6	1375	055F	Unsigned 16	2
OpTime_CapCalibrations.CH7	1376	0560	Unsigned 16	2
OpTime_CapSterilisations.CH0	1345	0541	Unsigned 8	1
OpTime_CapSterilisations.CH1	1346	0542	Unsigned 8	1
OpTime_CapSterilisations.CH2	1347	0543	Unsigned 8	1
OpTime_CapSterilisations.CH3	1348	0544	Unsigned 8	1
OpTime_CapSterilisations.CH4	1349	0545	Unsigned 8	1
OpTime_CapSterilisations.CH5	1350	0546	Unsigned 8	1
OpTime_CapSterilisations.CH6	1351	0547	Unsigned 8	1
OpTime_CapSterilisations.CH7	1352	0548	Unsigned 8	1
OpTime_CertDate.CH0	3080	0C08	Date	7
OpTime_CertDate.CH1	3081	0C09	Date	7
OpTime_CertDate.CH2	3082	0C0A	Date	7

Parameter and channel	ID	ID Hex	Type	Length
OpTime_CertDate.CH3	3083	0C0B	Date	7
OpTime_CertDate.CH4	3084	0C0C	Date	7
OpTime_CertDate.CH5	3085	0C0D	Date	7
OpTime_CertDate.CH6	3086	0C0E	Date	7
OpTime_CertDate.CH7	3087	0C0F	Date	7
OpTime_Charge.CH0	1353	0549	Float	5
OpTime_Charge.CH1	1354	054A	Float	5
OpTime_Charge.CH2	1355	054B	Float	5
OpTime_Charge.CH3	1356	054C	Float	5
OpTime_Charge.CH4	1357	054D	Float	5
OpTime_Charge.CH5	1358	054E	Float	5
OpTime_Charge.CH6	1359	054F	Float	5
OpTime_Charge.CH7	1360	0550	Float	5
OpTime_FilterChanged.CH0	1361	0551	Float	5
OpTime_FilterChanged.CH1	1362	0552	Float	5
OpTime_FilterChanged.CH2	1363	0553	Float	5
OpTime_FilterChanged.CH3	1364	0554	Float	5
OpTime_FilterChanged.CH4	1365	0555	Float	5
OpTime_FilterChanged.CH5	1366	0556	Float	5
OpTime_FilterChanged.CH6	1367	0557	Float	5
OpTime_FilterChanged.CH7	1368	0558	Float	5
OpTime_FlashCounter.CH0	2526	09DE	Unsigned 32	4
OpTime_FlashCounter.CH1	2527	09DF	Unsigned 32	4
OpTime_FlashCounter.CH2	2528	09E0	Unsigned 32	4
OpTime_FlashCounter.CH3	2529	09E1	Unsigned 32	4
OpTime_FlashCounter.CH4	2530	09E2	Unsigned 32	4
OpTime_FlashCounter.CH5	2531	09E3	Unsigned 32	4
OpTime_FlashCounter.CH6	2532	09E4	Unsigned 32	4
OpTime_FlashCounter.CH7	2533	09E5	Unsigned 32	4
OpTime_LampLife.CH0	1393	0571	Float	5
OpTime_LampLife.CH1	1394	0572	Float	5
OpTime_LampLife.CH2	1395	0573	Float	5
OpTime_LampLife.CH3	1396	0574	Float	5
OpTime_LampLife.CH4	1397	0575	Float	5
OpTime_LampLife.CH5	1398	0576	Float	5
OpTime_LampLife.CH6	1399	0577	Float	5
OpTime_LampLife.CH7	1400	0578	Float	5
OpTime_LightsourceDegradation.CH0	4731	127B	Float	5
OpTime_LightsourceDegradation.CH1	4732	127C	Float	5
OpTime_LightsourceDegradation.CH2	4733	127D	Float	5
OpTime_LightsourceDegradation.CH3	4734	127E	Float	5
OpTime_LightsourceDegradation.CH4	4735	127F	Float	5
OpTime_LightsourceDegradation.CH5	4736	1280	Float	5
OpTime_LightsourceDegradation.CH6	4737	1281	Float	5
OpTime_LightsourceDegradation.CH7	4738	1282	Float	5
OpTime_RefFilterChanged.CH0	3048	0BE8	Float	5
OpTime_RefFilterChanged.CH1	3049	0BE9	Float	5
OpTime_RefFilterChanged.CH2	3050	0BEA	Float	5
OpTime_RefFilterChanged.CH3	3051	0BEB	Float	5
OpTime_RefFilterChanged.CH4	3052	0BEC	Float	5
OpTime_RefFilterChanged.CH5	3053	0BED	Float	5
OpTime_RefFilterChanged.CH6	3054	0BEE	Float	5
OpTime_RefFilterChanged.CH7	3055	0BEF	Float	5
OpTime_Sterilisations.CH0	1377	0561	Unsigned 16	2
OpTime_Sterilisations.CH1	1378	0562	Unsigned 16	2
OpTime_Sterilisations.CH2	1379	0563	Unsigned 16	2
OpTime_Sterilisations.CH3	1380	0564	Unsigned 16	2
OpTime_Sterilisations.CH4	1381	0565	Unsigned 16	2
OpTime_Sterilisations.CH5	1382	0566	Unsigned 16	2
OpTime_Sterilisations.CH6	1383	0567	Unsigned 16	2
OpTime_Sterilisations.CH7	1384	0568	Unsigned 16	2
OpTime_Total.CH0	1337	0539	Float	5
OpTime_Total.CH1	1338	053A	Float	5
OpTime_Total.CH2	1339	053B	Float	5
OpTime_Total.CH3	1340	053C	Float	5
OpTime_Total.CH4	1341	053D	Float	5
OpTime_Total.CH5	1342	053E	Float	5
OpTime_Total.CH6	1343	053F	Float	5
OpTime_Total.CH7	1344	0540	Float	5
Sensor Calibration				
AdjustmentDeviation.CH0	4699	125B	Float	5
AdjustmentDeviation.CH1	4700	125C	Float	5
AdjustmentDeviation.CH2	4701	125D	Float	5
AdjustmentDeviation.CH3	4702	125E	Float	5
AdjustmentDeviation.CH4	4703	125F	Float	5

Parameter and channel	ID	ID Hex	Type	Length
AdjustmentDeviation.CH5	4704	1260	Float	5
AdjustmentDeviation.CH6	4705	1261	Float	5
AdjustmentDeviation.CH7	4706	1262	Float	5
CalTemp_Count.CH0	1681	0691	Unsigned 16	2
CalTemp_Count.CH1	1682	0692	Unsigned 16	2
CalTemp_Count.CH2	1683	0693	Unsigned 16	2
CalTemp_Count.CH3	1684	0694	Unsigned 16	2
CalTemp_Count.CH4	1685	0695	Unsigned 16	2
CalTemp_Count.CH5	1686	0696	Unsigned 16	2
CalTemp_Count.CH6	1687	0697	Unsigned 16	2
CalTemp_Count.CH7	1688	0698	Unsigned 16	2
CalTemp_DateTime.CH0	1641	0669	Date	7
CalTemp_DateTime.CH1	1642	066A	Date	7
CalTemp_DateTime.CH2	1643	066B	Date	7
CalTemp_DateTime.CH3	1644	066C	Date	7
CalTemp_DateTime.CH4	1645	066D	Date	7
CalTemp_DateTime.CH5	1646	066E	Date	7
CalTemp_DateTime.CH6	1647	066F	Date	7
CalTemp_DateTime.CH7	1648	0670	Date	7
CalTemp_Method.CH0	1537	0601	ESICalibType	1
CalTemp_Method.CH1	1538	0602	ESICalibType	1
CalTemp_Method.CH2	1539	0603	ESICalibType	1
CalTemp_Method.CH3	1540	0604	ESICalibType	1
CalTemp_Method.CH4	1541	0605	ESICalibType	1
CalTemp_Method.CH5	1542	0606	ESICalibType	1
CalTemp_Method.CH6	1543	0607	ESICalibType	1
CalTemp_Method.CH7	1544	0608	ESICalibType	1
CalTemp_Offset.CH0	1721	06B9	Float	5
CalTemp_Offset.CH1	1722	06BA	Float	5
CalTemp_Offset.CH2	1723	06BB	Float	5
CalTemp_Offset.CH3	1724	06BC	Float	5
CalTemp_Offset.CH4	1725	06BD	Float	5
CalTemp_Offset.CH5	1726	06BE	Float	5
CalTemp_Offset.CH6	1727	06BF	Float	5
CalTemp_Offset.CH7	1728	06C0	Float	5
CalTemp_OpHours.CH0	3775	0EBF	Float	5
CalTemp_OpHours.CH1	3776	0EC0	Float	5
CalTemp_OpHours.CH2	3777	0EC1	Float	5
CalTemp_OpHours.CH3	3778	0EC2	Float	5
CalTemp_OpHours.CH4	3779	0EC3	Float	5
CalTemp_OpHours.CH5	3780	0EC4	Float	5
CalTemp_OpHours.CH6	3781	0EC5	Float	5
CalTemp_OpHours.CH7	3782	0EC6	Float	5
CalTemp_RefValue1.CH0	1569	0621	Float	5
CalTemp_RefValue1.CH1	1570	0622	Float	5
CalTemp_RefValue1.CH2	1571	0623	Float	5
CalTemp_RefValue1.CH3	1572	0624	Float	5
CalTemp_RefValue1.CH4	1573	0625	Float	5
CalTemp_RefValue1.CH5	1574	0626	Float	5
CalTemp_RefValue1.CH6	1575	0627	Float	5
CalTemp_RefValue1.CH7	1576	0628	Float	5
CalTemp_RefValue2.CH0	1577	0629	Float	5
CalTemp_RefValue2.CH1	1578	062A	Float	5
CalTemp_RefValue2.CH2	1579	062B	Float	5
CalTemp_RefValue2.CH3	1580	062C	Float	5
CalTemp_RefValue2.CH4	1581	062D	Float	5
CalTemp_RefValue2.CH5	1582	062E	Float	5
CalTemp_RefValue2.CH6	1583	062F	Float	5
CalTemp_RefValue2.CH7	1584	0630	Float	5
CalTemp_Slope.CH0	1489	05D1	Float	5
CalTemp_Slope.CH1	1490	05D2	Float	5
CalTemp_Slope.CH2	1491	05D3	Float	5
CalTemp_Slope.CH3	1492	05D4	Float	5
CalTemp_Slope.CH4	1493	05D5	Float	5
CalTemp_Slope.CH5	1494	05D6	Float	5
CalTemp_Slope.CH6	1495	05D7	Float	5
CalTemp_Slope.CH7	1496	05D8	Float	5
CalTemp_TransmitterID.CH0	1465	05B9	Unsigned 16	2
CalTemp_TransmitterID.CH1	1466	05BA	Unsigned 16	2
CalTemp_TransmitterID.CH2	1467	05BB	Unsigned 16	2
CalTemp_TransmitterID.CH3	1468	05BC	Unsigned 16	2
CalTemp_TransmitterID.CH4	1469	05BD	Unsigned 16	2
CalTemp_TransmitterID.CH5	1470	05BE	Unsigned 16	2
CalTemp_TransmitterID.CH6	1471	05BF	Unsigned 16	2
CalTemp_TransmitterID.CH7	1472	05C0	Unsigned 16	2
CalTemp_TransmitterSerial.CH0	1593	0639	String	33

Parameter and channel	ID	ID Hex	Type	Length
CalTemp_TransmitterSerial.CH1	1594	063A	String	33
CalTemp_TransmitterSerial.CH2	1595	063B	String	33
CalTemp_TransmitterSerial.CH3	1596	063C	String	33
CalTemp_TransmitterSerial.CH4	1597	063D	String	33
CalTemp_TransmitterSerial.CH5	1598	063E	String	33
CalTemp_TransmitterSerial.CH6	1599	063F	String	33
CalTemp_TransmitterSerial.CH7	1600	0640	String	33
CalTemp_Valid.CH0	4280	10B8	Boolean	1
CalTemp_Valid.CH1	4281	10B9	Boolean	1
CalTemp_Valid.CH2	4282	10BA	Boolean	1
CalTemp_Valid.CH3	4283	10BB	Boolean	1
CalTemp_Valid.CH4	4284	10BC	Boolean	1
CalTemp_Valid.CH5	4285	10BD	Boolean	1
CalTemp_Valid.CH6	4286	10BE	Boolean	1
CalTemp_Valid.CH7	4287	10BF	Boolean	1
CalZero_CapCount.CH0	3784	0EC8	Unsigned 16	2
CalZero_CapCount.CH1	3785	0EC9	Unsigned 16	2
CalZero_CapCount.CH2	3786	0ECA	Unsigned 16	2
CalZero_CapCount.CH3	3787	0ECB	Unsigned 16	2
CalZero_CapCount.CH4	3788	0ECC	Unsigned 16	2
CalZero_CapCount.CH5	3789	0ECD	Unsigned 16	2
CalZero_CapCount.CH6	3790	0ECE	Unsigned 16	2
CalZero_CapCount.CH7	3791	0ECF	Unsigned 16	2
CalZero_CapOpHours.CH0	4023	0FB7	Float	5
CalZero_CapOpHours.CH1	4024	0FB8	Float	5
CalZero_CapOpHours.CH2	4025	0FB9	Float	5
CalZero_CapOpHours.CH3	4026	0FBA	Float	5
CalZero_CapOpHours.CH4	4027	0FBB	Float	5
CalZero_CapOpHours.CH5	4028	0FBC	Float	5
CalZero_CapOpHours.CH6	4029	0FBD	Float	5
CalZero_CapOpHours.CH7	4030	0FBE	Float	5
CalZero_Count.CH0	1729	06C1	Unsigned 16	2
CalZero_Count.CH1	1730	06C2	Unsigned 16	2
CalZero_Count.CH2	1731	06C3	Unsigned 16	2
CalZero_Count.CH3	1732	06C4	Unsigned 16	2
CalZero_Count.CH4	1733	06C5	Unsigned 16	2
CalZero_Count.CH5	1734	06C6	Unsigned 16	2
CalZero_Count.CH6	1735	06C7	Unsigned 16	2
CalZero_Count.CH7	1736	06C8	Unsigned 16	2
CalZero_DateTime.CH0	1505	05E1	Date	7
CalZero_DateTime.CH1	1506	05E2	Date	7
CalZero_DateTime.CH2	1507	05E3	Date	7
CalZero_DateTime.CH3	1508	05E4	Date	7
CalZero_DateTime.CH4	1509	05E5	Date	7
CalZero_DateTime.CH5	1510	05E6	Date	7
CalZero_DateTime.CH6	1511	05E7	Date	7
CalZero_DateTime.CH7	1512	05E8	Date	7
CalZero_DeltaZero.CH0	1457	05B1	Float	5
CalZero_DeltaZero.CH1	1458	05B2	Float	5
CalZero_DeltaZero.CH2	1459	05B3	Float	5
CalZero_DeltaZero.CH3	1460	05B4	Float	5
CalZero_DeltaZero.CH4	1461	05B5	Float	5
CalZero_DeltaZero.CH5	1462	05B6	Float	5
CalZero_DeltaZero.CH6	1463	05B7	Float	5
CalZero_DeltaZero.CH7	1464	05B8	Float	5
CalZero_Ksv.CH0	3603	0E13	Float	5
CalZero_Ksv.CH1	3604	0E14	Float	5
CalZero_Ksv.CH2	3605	0E15	Float	5
CalZero_Ksv.CH3	3606	0E16	Float	5
CalZero_Ksv.CH4	3607	0E17	Float	5
CalZero_Ksv.CH5	3608	0E18	Float	5
CalZero_Ksv.CH6	3609	0E19	Float	5
CalZero_Ksv.CH7	3610	0E1A	Float	5
CalZero_Method.CH0	1585	0631	ESICalibType	1
CalZero_Method.CH1	1586	0632	ESICalibType	1
CalZero_Method.CH2	1587	0633	ESICalibType	1
CalZero_Method.CH3	1588	0634	ESICalibType	1
CalZero_Method.CH4	1589	0635	ESICalibType	1
CalZero_Method.CH5	1590	0636	ESICalibType	1
CalZero_Method.CH6	1591	0637	ESICalibType	1
CalZero_Method.CH7	1592	0638	ESICalibType	1
CalZero_OpHours.CH0	3843	0F03	Float	5
CalZero_OpHours.CH1	3844	0F04	Float	5
CalZero_OpHours.CH2	3845	0F05	Float	5
CalZero_OpHours.CH3	3846	0F06	Float	5
CalZero_OpHours.CH4	3847	0F07	Float	5

Parameter and channel	ID	ID Hex	Type	Length
CalZero_OpHours.CH5	3848	0F08	Float	5
CalZero_OpHours.CH6	3849	0F09	Float	5
CalZero_OpHours.CH7	3850	0F0A	Float	5
CalZero_Quality.CH0	4112	1010	Float	5
CalZero_Quality.CH1	4113	1011	Float	5
CalZero_Quality.CH2	4114	1012	Float	5
CalZero_Quality.CH3	4115	1013	Float	5
CalZero_Quality.CH4	4116	1014	Float	5
CalZero_Quality.CH5	4117	1015	Float	5
CalZero_Quality.CH6	4118	1016	Float	5
CalZero_Quality.CH7	4119	1017	Float	5
CalZero_Tau.CH0	1697	06A1	Float	5
CalZero_Tau.CH1	1698	06A2	Float	5
CalZero_Tau.CH2	1699	06A3	Float	5
CalZero_Tau.CH3	1700	06A4	Float	5
CalZero_Tau.CH4	1701	06A5	Float	5
CalZero_Tau.CH5	1702	06A6	Float	5
CalZero_Tau.CH6	1703	06A7	Float	5
CalZero_Tau.CH7	1704	06A8	Float	5
CalZero_TransmitterSerial.CH0	1745	06D1	String	33
CalZero_TransmitterSerial.CH1	1746	06D2	String	33
CalZero_TransmitterSerial.CH2	1747	06D3	String	33
CalZero_TransmitterSerial.CH3	1748	06D4	String	33
CalZero_TransmitterSerial.CH4	1749	06D5	String	33
CalZero_TransmitterSerial.CH5	1750	06D6	String	33
CalZero_TransmitterSerial.CH6	1751	06D7	String	33
CalZero_TransmitterSerial.CH7	1752	06D8	String	33
CalZero_Valid.CH0	3692	0E6C	Boolean	1
CalZero_Valid.CH1	3693	0E6D	Boolean	1
CalZero_Valid.CH2	3694	0E6E	Boolean	1
CalZero_Valid.CH3	3695	0E6F	Boolean	1
CalZero_Valid.CH4	3696	0E70	Boolean	1
CalZero_Valid.CH5	3697	0E71	Boolean	1
CalZero_Valid.CH6	3698	0E72	Boolean	1
CalZero_Valid.CH7	3699	0E73	Boolean	1
CalZero_Zero.CH0	1673	0689	Float	5
CalZero_Zero.CH1	1674	068A	Float	5
CalZero_Zero.CH2	1675	068B	Float	5
CalZero_Zero.CH3	1676	068C	Float	5
CalZero_Zero.CH4	1677	068D	Float	5
CalZero_Zero.CH5	1678	068E	Float	5
CalZero_Zero.CH6	1679	068F	Float	5
CalZero_Zero.CH7	1680	0690	Float	5
Cal_AssayCount.CH0	1801	0709	Unsigned 8	1
Cal_AssayCount.CH1	1802	070A	Unsigned 8	1
Cal_AssayCount.CH2	1803	070B	Unsigned 8	1
Cal_AssayCount.CH3	1804	070C	Unsigned 8	1
Cal_AssayCount.CH4	1805	070D	Unsigned 8	1
Cal_AssayCount.CH5	1806	070E	Unsigned 8	1
Cal_AssayCount.CH6	1807	070F	Unsigned 8	1
Cal_AssayCount.CH7	1808	0710	Unsigned 8	1
Cal_BODFactor.CH0	2947	0B83	Float	5
Cal_BODFactor.CH1	2948	0B84	Float	5
Cal_BODFactor.CH2	2949	0B85	Float	5
Cal_BODFactor.CH3	2950	0B86	Float	5
Cal_BODFactor.CH4	2951	0B87	Float	5
Cal_BODFactor.CH5	2952	0B88	Float	5
Cal_BODFactor.CH6	2953	0B89	Float	5
Cal_BODFactor.CH7	2954	0B8A	Float	5
Cal_Buffer1_0.CH0	3990	0F96	Float	5
Cal_Buffer1_0.CH1	3991	0F97	Float	5
Cal_Buffer1_0.CH2	3992	0F98	Float	5
Cal_Buffer1_0.CH3	3993	0F99	Float	5
Cal_Buffer1_0.CH4	3994	0F9A	Float	5
Cal_Buffer1_0.CH5	3995	0F9B	Float	5
Cal_Buffer1_0.CH6	3996	0F9C	Float	5
Cal_Buffer1_0.CH7	3997	0F9D	Float	5
Cal_Buffer2_0.CH0	4196	1064	Float	5
Cal_Buffer2_0.CH1	4197	1065	Float	5
Cal_Buffer2_0.CH2	4198	1066	Float	5
Cal_Buffer2_0.CH3	4199	1067	Float	5
Cal_Buffer2_0.CH4	4200	1068	Float	5
Cal_Buffer2_0.CH5	4201	1069	Float	5
Cal_Buffer2_0.CH6	4202	106A	Float	5
Cal_Buffer2_0.CH7	4203	106B	Float	5
Cal_Buffer3_0.CH0	3948	0F6C	Float	5

Parameter and channel	ID	ID Hex	Type	Length
Cal_Buffer3_0.CH1	3949	0F6D	Float	5
Cal_Buffer3_0.CH2	3950	0F6E	Float	5
Cal_Buffer3_0.CH3	3951	0F6F	Float	5
Cal_Buffer3_0.CH4	3952	0F70	Float	5
Cal_Buffer3_0.CH5	3953	0F71	Float	5
Cal_Buffer3_0.CH6	3954	0F72	Float	5
Cal_Buffer3_0.CH7	3955	0F73	Float	5
Cal_CODFactor.CH0	1809	0711	Float	5
Cal_CODFactor.CH1	1810	0712	Float	5
Cal_CODFactor.CH2	1811	0713	Float	5
Cal_CODFactor.CH3	1812	0714	Float	5
Cal_CODFactor.CH4	1813	0715	Float	5
Cal_CODFactor.CH5	1814	0716	Float	5
Cal_CODFactor.CH6	1815	0717	Float	5
Cal_CODFactor.CH7	1816	0718	Float	5
Cal_CapCount.CH0	4254	109E	Unsigned 16	2
Cal_CapCount.CH1	4255	109F	Unsigned 16	2
Cal_CapCount.CH2	4256	10A0	Unsigned 16	2
Cal_CapCount.CH3	4257	10A1	Unsigned 16	2
Cal_CapCount.CH4	4258	10A2	Unsigned 16	2
Cal_CapCount.CH5	4259	10A3	Unsigned 16	2
Cal_CapCount.CH6	4260	10A4	Unsigned 16	2
Cal_CapCount.CH7	4261	10A5	Unsigned 16	2
Cal_CapOpHours.CH0	3876	0F24	Float	5
Cal_CapOpHours.CH1	3877	0F25	Float	5
Cal_CapOpHours.CH2	3878	0F26	Float	5
Cal_CapOpHours.CH3	3879	0F27	Float	5
Cal_CapOpHours.CH4	3880	0F28	Float	5
Cal_CapOpHours.CH5	3881	0F29	Float	5
Cal_CapOpHours.CH6	3882	0F2A	Float	5
Cal_CapOpHours.CH7	3883	0F2B	Float	5
Cal_CellConstant.CH0	1545	0609	Float	5
Cal_CellConstant.CH1	1546	060A	Float	5
Cal_CellConstant.CH2	1547	060B	Float	5
Cal_CellConstant.CH3	1548	060C	Float	5
Cal_CellConstant.CH4	1549	060D	Float	5
Cal_CellConstant.CH5	1550	060E	Float	5
Cal_CellConstant.CH6	1551	060F	Float	5
Cal_CellConstant.CH7	1552	0610	Float	5
Cal_Concentration1_0.CH0	4430	114E	Float	5
Cal_Concentration1_0.CH1	4431	114F	Float	5
Cal_Concentration1_0.CH2	4432	1150	Float	5
Cal_Concentration1_0.CH3	4433	1151	Float	5
Cal_Concentration1_0.CH4	4434	1152	Float	5
Cal_Concentration1_0.CH5	4435	1153	Float	5
Cal_Concentration1_0.CH6	4436	1154	Float	5
Cal_Concentration1_0.CH7	4437	1155	Float	5
Cal_Concentration2_0.CH0	4405	1135	Float	5
Cal_Concentration2_0.CH1	4406	1136	Float	5
Cal_Concentration2_0.CH2	4407	1137	Float	5
Cal_Concentration2_0.CH3	4408	1138	Float	5
Cal_Concentration2_0.CH4	4409	1139	Float	5
Cal_Concentration2_0.CH5	4410	113A	Float	5
Cal_Concentration2_0.CH6	4411	113B	Float	5
Cal_Concentration2_0.CH7	4412	113C	Float	5
Cal_Count_0.CH0	2646	0A56	Unsigned 16	2
Cal_Count_0.CH1	2647	0A57	Unsigned 16	2
Cal_Count_0.CH2	2648	0A58	Unsigned 16	2
Cal_Count_0.CH3	2649	0A59	Unsigned 16	2
Cal_Count_0.CH4	2650	0A5A	Unsigned 16	2
Cal_Count_0.CH5	2651	0A5B	Unsigned 16	2
Cal_Count_0.CH6	2652	0A5C	Unsigned 16	2
Cal_Count_0.CH7	2653	0A5D	Unsigned 16	2
Cal_DOCFactor.CH0	2850	0B22	Float	5
Cal_DOCFactor.CH1	2851	0B23	Float	5
Cal_DOCFactor.CH2	2852	0B24	Float	5
Cal_DOCFactor.CH3	2853	0B25	Float	5
Cal_DOCFactor.CH4	2854	0B26	Float	5
Cal_DOCFactor.CH5	2855	0B27	Float	5
Cal_DOCFactor.CH6	2856	0B28	Float	5
Cal_DOCFactor.CH7	2857	0B29	Float	5
Cal_DateTime_0.CH0	2590	0A1E	Date	7
Cal_DateTime_0.CH1	2591	0A1F	Date	7
Cal_DateTime_0.CH2	2592	0A20	Date	7
Cal_DateTime_0.CH3	2593	0A21	Date	7
Cal_DateTime_0.CH4	2594	0A22	Date	7

Parameter and channel	ID	ID Hex	Type	Length
Cal_DateTime_0.CH5	2595	0A23	Date	7
Cal_DateTime_0.CH6	2596	0A24	Date	7
Cal_DateTime_0.CH7	2597	0A25	Date	7
Cal_Factor.CH0	3529	0DC9	Float	5
Cal_Factor.CH1	3530	0DCA	Float	5
Cal_Factor.CH2	3531	0DCB	Float	5
Cal_Factor.CH3	3532	0DCC	Float	5
Cal_Factor.CH4	3533	0DCD	Float	5
Cal_Factor.CH5	3534	0DCE	Float	5
Cal_Factor.CH6	3535	0DCF	Float	5
Cal_Factor.CH7	3536	0DD0	Float	5
Cal_Isothermal_mV.CH0	1625	0659	Float	5
Cal_Isothermal_mV.CH1	1626	065A	Float	5
Cal_Isothermal_mV.CH2	1627	065B	Float	5
Cal_Isothermal_mV.CH3	1628	065C	Float	5
Cal_Isothermal_mV.CH4	1629	065D	Float	5
Cal_Isothermal_mV.CH5	1630	065E	Float	5
Cal_Isothermal_mV.CH6	1631	065F	Float	5
Cal_Isothermal_mV.CH7	1632	0660	Float	5
Cal_Isothermal_pH.CH0	1649	0671	Float	5
Cal_Isothermal_pH.CH1	1650	0672	Float	5
Cal_Isothermal_pH.CH2	1651	0673	Float	5
Cal_Isothermal_pH.CH3	1652	0674	Float	5
Cal_Isothermal_pH.CH4	1653	0675	Float	5
Cal_Isothermal_pH.CH5	1654	0676	Float	5
Cal_Isothermal_pH.CH6	1655	0677	Float	5
Cal_Isothermal_pH.CH7	1656	0678	Float	5
Cal_Ksv.CH0	4212	1074	Float	5
Cal_Ksv.CH1	4213	1075	Float	5
Cal_Ksv.CH2	4214	1076	Float	5
Cal_Ksv.CH3	4215	1077	Float	5
Cal_Ksv.CH4	4216	1078	Float	5
Cal_Ksv.CH5	4217	1079	Float	5
Cal_Ksv.CH6	4218	107A	Float	5
Cal_Ksv.CH7	4219	107B	Float	5
Cal_Manual_Offset_0.CH0	3957	0F75	Float	5
Cal_Manual_Offset_0.CH1	3958	0F76	Float	5
Cal_Manual_Offset_0.CH2	3959	0F77	Float	5
Cal_Manual_Offset_0.CH3	3960	0F78	Float	5
Cal_Manual_Offset_0.CH4	3961	0F79	Float	5
Cal_Manual_Offset_0.CH5	3962	0F7A	Float	5
Cal_Manual_Offset_0.CH6	3963	0F7B	Float	5
Cal_Manual_Offset_0.CH7	3964	0F7C	Float	5
Cal_Manual_Offset_1.CH0	3916	0F4C	Float	5
Cal_Manual_Offset_1.CH1	3917	0F4D	Float	5
Cal_Manual_Offset_1.CH2	3918	0F4E	Float	5
Cal_Manual_Offset_1.CH3	3919	0F4F	Float	5
Cal_Manual_Offset_1.CH4	3920	0F50	Float	5
Cal_Manual_Offset_1.CH5	3921	0F51	Float	5
Cal_Manual_Offset_1.CH6	3922	0F52	Float	5
Cal_Manual_Offset_1.CH7	3923	0F53	Float	5
Cal_Method_0.CH0	3554	0DE2	ESICalibType	1
Cal_Method_0.CH1	3555	0DE3	ESICalibType	1
Cal_Method_0.CH2	3556	0DE4	ESICalibType	1
Cal_Method_0.CH3	3557	0DE5	ESICalibType	1
Cal_Method_0.CH4	3558	0DE6	ESICalibType	1
Cal_Method_0.CH5	3559	0DE7	ESICalibType	1
Cal_Method_0.CH6	3560	0DE8	ESICalibType	1
Cal_Method_0.CH7	3561	0DE9	ESICalibType	1
Cal_NumDataSets.CH0	4397	112D	Unsigned 8	1
Cal_NumDataSets.CH1	4398	112E	Unsigned 8	1
Cal_NumDataSets.CH2	4399	112F	Unsigned 8	1
Cal_NumDataSets.CH3	4400	1130	Unsigned 8	1
Cal_NumDataSets.CH4	4401	1131	Unsigned 8	1
Cal_NumDataSets.CH5	4402	1132	Unsigned 8	1
Cal_NumDataSets.CH6	4403	1133	Unsigned 8	1
Cal_NumDataSets.CH7	4404	1134	Unsigned 8	1
Cal_Offset.CH0	1657	0679	Float	5
Cal_Offset.CH1	1658	067A	Float	5
Cal_Offset.CH2	1659	067B	Float	5
Cal_Offset.CH3	1660	067C	Float	5
Cal_Offset.CH4	1661	067D	Float	5
Cal_Offset.CH5	1662	067E	Float	5
Cal_Offset.CH6	1663	067F	Float	5
Cal_Offset.CH7	1664	0680	Float	5
Cal_OpHours.CH0	3635	0E33	Float	5

Parameter and channel	ID	ID Hex	Type	Length
Cal_OpHours.CH1	3636	0E34	Float	5
Cal_OpHours.CH2	3637	0E35	Float	5
Cal_OpHours.CH3	3638	0E36	Float	5
Cal_OpHours.CH4	3639	0E37	Float	5
Cal_OpHours.CH5	3640	0E38	Float	5
Cal_OpHours.CH6	3641	0E39	Float	5
Cal_OpHours.CH7	3642	0E3A	Float	5
Cal_OperationPoint.CH0	1521	05F1	Float	5
Cal_OperationPoint.CH1	1522	05F2	Float	5
Cal_OperationPoint.CH2	1523	05F3	Float	5
Cal_OperationPoint.CH3	1524	05F4	Float	5
Cal_OperationPoint.CH4	1525	05F5	Float	5
Cal_OperationPoint.CH5	1526	05F6	Float	5
Cal_OperationPoint.CH6	1527	05F7	Float	5
Cal_OperationPoint.CH7	1528	05F8	Float	5
Cal_Quality.CH0	3709	0E7D	Float	5
Cal_Quality.CH1	3710	0E7E	Float	5
Cal_Quality.CH2	3711	0E7F	Float	5
Cal_Quality.CH3	3712	0E80	Float	5
Cal_Quality.CH4	3713	0E81	Float	5
Cal_Quality.CH5	3714	0E82	Float	5
Cal_Quality.CH6	3715	0E83	Float	5
Cal_Quality.CH7	3716	0E84	Float	5
Cal_RefValue1_0.CH0	3429	0D65	Float	5
Cal_RefValue1_0.CH1	3430	0D66	Float	5
Cal_RefValue1_0.CH2	3431	0D67	Float	5
Cal_RefValue1_0.CH3	3432	0D68	Float	5
Cal_RefValue1_0.CH4	3433	0D69	Float	5
Cal_RefValue1_0.CH5	3434	0D6A	Float	5
Cal_RefValue1_0.CH6	3435	0D6B	Float	5
Cal_RefValue1_0.CH7	3436	0D6C	Float	5
Cal_RefValue2_0.CH0	3512	0DB8	Float	5
Cal_RefValue2_0.CH1	3513	0DB9	Float	5
Cal_RefValue2_0.CH2	3514	0DBA	Float	5
Cal_RefValue2_0.CH3	3515	0DBB	Float	5
Cal_RefValue2_0.CH4	3516	0DBC	Float	5
Cal_RefValue2_0.CH5	3517	0DBD	Float	5
Cal_RefValue2_0.CH6	3518	0DBE	Float	5
Cal_RefValue2_0.CH7	3519	0DBF	Float	5
Cal_Slope_0.CH0	3496	0DA8	Float	5
Cal_Slope_0.CH1	3497	0DA9	Float	5
Cal_Slope_0.CH2	3498	0DAA	Float	5
Cal_Slope_0.CH3	3499	0DAB	Float	5
Cal_Slope_0.CH4	3500	0DAC	Float	5
Cal_Slope_0.CH5	3501	0DAD	Float	5
Cal_Slope_0.CH6	3502	0DAE	Float	5
Cal_Slope_0.CH7	3503	0DAF	Float	5
Cal_TOCFactor.CH0	1705	06A9	Float	5
Cal_TOCFactor.CH1	1706	06AA	Float	5
Cal_TOCFactor.CH2	1707	06AB	Float	5
Cal_TOCFactor.CH3	1708	06AC	Float	5
Cal_TOCFactor.CH4	1709	06AD	Float	5
Cal_TOCFactor.CH5	1710	06AE	Float	5
Cal_TOCFactor.CH6	1711	06AF	Float	5
Cal_TOCFactor.CH7	1712	06B0	Float	5
Cal_Tau.CH0	3701	0E75	Float	5
Cal_Tau.CH1	3702	0E76	Float	5
Cal_Tau.CH2	3703	0E77	Float	5
Cal_Tau.CH3	3704	0E78	Float	5
Cal_Tau.CH4	3705	0E79	Float	5
Cal_Tau.CH5	3706	0E7A	Float	5
Cal_Tau.CH6	3707	0E7B	Float	5
Cal_Tau.CH7	3708	0E7C	Float	5
Cal_TransmitterID.CH0	1481	05C9	Unsigned 16	2
Cal_TransmitterID.CH1	1482	05CA	Unsigned 16	2
Cal_TransmitterID.CH2	1483	05CB	Unsigned 16	2
Cal_TransmitterID.CH3	1484	05CC	Unsigned 16	2
Cal_TransmitterID.CH4	1485	05CD	Unsigned 16	2
Cal_TransmitterID.CH5	1486	05CE	Unsigned 16	2
Cal_TransmitterID.CH6	1487	05CF	Unsigned 16	2
Cal_TransmitterID.CH7	1488	05D0	Unsigned 16	2
Cal_TransmitterSerial_0.CH0	3594	0E0A	String	33
Cal_TransmitterSerial_0.CH1	3595	0E0B	String	33
Cal_TransmitterSerial_0.CH2	3596	0E0C	String	33
Cal_TransmitterSerial_0.CH3	3597	0E0D	String	33
Cal_TransmitterSerial_0.CH4	3598	0E0E	String	33

Parameter and channel	ID	ID Hex	Type	Length
Cal_TransmitterSerial_0.CH5	3599	0E0F	String	33
Cal_TransmitterSerial_0.CH6	3600	0E10	String	33
Cal_TransmitterSerial_0.CH7	3601	0E11	String	33
Cal_Valid.CH0	3578	0DFA	Boolean	1
Cal_Valid.CH1	3579	0DFB	Boolean	1
Cal_Valid.CH2	3580	0DFC	Boolean	1
Cal_Valid.CH3	3581	0DFD	Boolean	1
Cal_Valid.CH4	3582	0DFE	Boolean	1
Cal_Valid.CH5	3583	0DFF	Boolean	1
Cal_Valid.CH6	3584	0E00	Boolean	1
Cal_Valid.CH7	3585	0E01	Boolean	1
Cal_ZeroPoint_0.CH0	4063	0FDF	Float	5
Cal_ZeroPoint_0.CH1	4064	0FE0	Float	5
Cal_ZeroPoint_0.CH2	4065	0FE1	Float	5
Cal_ZeroPoint_0.CH3	4066	0FE2	Float	5
Cal_ZeroPoint_0.CH4	4067	0FE3	Float	5
Cal_ZeroPoint_0.CH5	4068	0FE4	Float	5
Cal_ZeroPoint_0.CH6	4069	0FE5	Float	5
Cal_ZeroPoint_0.CH7	4070	0FE6	Float	5
CalibrationValidity.CH0	4707	1263	Date	7
CalibrationValidity.CH1	4708	1264	Date	7
CalibrationValidity.CH2	4709	1265	Date	7
CalibrationValidity.CH3	4710	1266	Date	7
CalibrationValidity.CH4	4711	1267	Date	7
CalibrationValidity.CH5	4712	1268	Date	7
CalibrationValidity.CH6	4713	1269	Date	7
CalibrationValidity.CH7	4714	126A	Date	7
Delta_CellConstant.CH0	1473	05C1	Float	5
Delta_CellConstant.CH1	1474	05C2	Float	5
Delta_CellConstant.CH2	1475	05C3	Float	5
Delta_CellConstant.CH3	1476	05C4	Float	5
Delta_CellConstant.CH4	1477	05C5	Float	5
Delta_CellConstant.CH5	1478	05C6	Float	5
Delta_CellConstant.CH6	1479	05C7	Float	5
Delta_CellConstant.CH7	1480	05C8	Float	5
Delta_MeasValue1_0.CH0	4372	1114	Float	5
Delta_MeasValue1_0.CH1	4373	1115	Float	5
Delta_MeasValue1_0.CH2	4374	1116	Float	5
Delta_MeasValue1_0.CH3	4375	1117	Float	5
Delta_MeasValue1_0.CH4	4376	1118	Float	5
Delta_MeasValue1_0.CH5	4377	1119	Float	5
Delta_MeasValue1_0.CH6	4378	111A	Float	5
Delta_MeasValue1_0.CH7	4379	111B	Float	5
Delta_MeasValue2_0.CH0	4380	111C	Float	5
Delta_MeasValue2_0.CH1	4381	111D	Float	5
Delta_MeasValue2_0.CH2	4382	111E	Float	5
Delta_MeasValue2_0.CH3	4383	111F	Float	5
Delta_MeasValue2_0.CH4	4384	1120	Float	5
Delta_MeasValue2_0.CH5	4385	1121	Float	5
Delta_MeasValue2_0.CH6	4386	1122	Float	5
Delta_MeasValue2_0.CH7	4387	1123	Float	5
Delta_MeasValue3_0.CH0	3792	0ED0	Float	5
Delta_MeasValue3_0.CH1	3793	0ED1	Float	5
Delta_MeasValue3_0.CH2	3794	0ED2	Float	5
Delta_MeasValue3_0.CH3	3795	0ED3	Float	5
Delta_MeasValue3_0.CH4	3796	0ED4	Float	5
Delta_MeasValue3_0.CH5	3797	0ED5	Float	5
Delta_MeasValue3_0.CH6	3798	0ED6	Float	5
Delta_MeasValue3_0.CH7	3799	0ED7	Float	5
Delta_Offset.CH0	1777	06F1	Float	5
Delta_Offset.CH1	1778	06F2	Float	5
Delta_Offset.CH2	1779	06F3	Float	5
Delta_Offset.CH3	1780	06F4	Float	5
Delta_Offset.CH4	1781	06F5	Float	5
Delta_Offset.CH5	1782	06F6	Float	5
Delta_Offset.CH6	1783	06F7	Float	5
Delta_Offset.CH7	1784	06F8	Float	5
Delta_SetPoint.CH0	1529	05F9	Float	5
Delta_SetPoint.CH1	1530	05FA	Float	5
Delta_SetPoint.CH2	1531	05FB	Float	5
Delta_SetPoint.CH3	1532	05FC	Float	5
Delta_SetPoint.CH4	1533	05FD	Float	5
Delta_SetPoint.CH5	1534	05FE	Float	5
Delta_SetPoint.CH6	1535	05FF	Float	5
Delta_SetPoint.CH7	1536	0600	Float	5
Delta_Slope_0.CH0	3718	0E86	Float	5

Parameter and channel	ID	ID Hex	Type	Length
Delta_Slope_0.CH1	3719	0E87	Float	5
Delta_Slope_0.CH2	3720	0E88	Float	5
Delta_Slope_0.CH3	3721	0E89	Float	5
Delta_Slope_0.CH4	3722	0E8A	Float	5
Delta_Slope_0.CH5	3723	0E8B	Float	5
Delta_Slope_0.CH6	3724	0E8C	Float	5
Delta_Slope_0.CH7	3725	0E8D	Float	5
Delta_ZeroPoint_0.CH0	3420	0D5C	Float	5
Delta_ZeroPoint_0.CH1	3421	0D5D	Float	5
Delta_ZeroPoint_0.CH2	3422	0D5E	Float	5
Delta_ZeroPoint_0.CH3	3423	0D5F	Float	5
Delta_ZeroPoint_0.CH4	3424	0D60	Float	5
Delta_ZeroPoint_0.CH5	3425	0D61	Float	5
Delta_ZeroPoint_0.CH6	3426	0D62	Float	5
Delta_ZeroPoint_0.CH7	3427	0D63	Float	5

11.3. Data types for commands #224 and #225

11.3.1. Strings

Strings are transferred in the Latin-1 character set. They have a fixed length depending on the parameter and are zero terminated, i.e., a 0x00 will be added to the string regardless of its length. Unused characters are filled with 0x00. The leftmost character will be transferred first.

11.3.2. Floating point values

Floating point values are transferred in IEEE 754 - 1985 big endian format with a Liquiline unit code (see chapter 11.4). NaNs and too large or small values will lead to response code 12 'Invalid float'.
Beside the different unit codes this is the HART standard float format.

Byte	Description
0	CM44 unit code
1	Sign and exponent bits 2..8
2	Exponent bit 1 and fraction bits 17..23
3	Fraction bits 9..16
4	Fraction bits 1..8

11.3.3. Integer values

All integers are transferred in big endian format. The number of transferred bytes and the value range depends on the integer type:

Type	Bytes	Min	Max
Unsigned 8	1	0	255
Unsigned 16	2	0	65,535
Unsigned 32	4	0	4,294,967,295
Signed 8	1	-128	127
Signed 16	2	-32,768	32,767
Signed 32	4	-2,147,483,648	2,147,483,647

Singed integers use the two's complement format.

11.3.4. Enumeration values

Enumeration values are transferred as a single byte. The range depends on the parameter itself but can not exceed 255.

EHeartbeatSumVerdict

Enum	Value
None	0
Fail	1
Pass	2

EHeartbeatSensorStatus

Enum	Value
None	0
Sad	1
Neutral	2
Happy	3

ESIActivationState

Enum	Value
Deactivated	0
Active	1
Invalid	2

ESICalibType

Enum	Value	Value Hex
None	0	00
Data Input	1	01
1 Point	2	02
2 Point	3	03
Multipoint	4	04
Table	5	05
Assay Calibration Grab	6	06
Zeropoint	7	07
Slope Air	8	08
Slope Water	9	09
Slope Variable	10	0A
Zero Point Reference	11	0B
Slope Point Reference	12	0C
Offset	13	0D
Slope	14	0E
With Temperature Compensation	15	0F
Without Temperature Compensation	16	10
Standard Addition	17	11
Data Input Slope	18	12
Data Input Zero Point	19	13
Data Input Two Point	20	14
Factory	21	15
Testgas	22	16
Value Acquisition	23	17
3 Point	24	18
External Reference	25	19
Internal Reference	26	1A
Lamp Water	27	1B
Lamp Air	28	1C
Onboard Verification	29	1D

11.3.5. Boolean values

Boolean values are transferred as a single byte. 0 represents a 'false', 1 a 'true'.

11.3.6. Dates

Dates are encoded similar to EN61804-2:

Byte	Description
0..1	Millisecond (0..59999)
2	Minute (0..59)
3	Hour (0..23)
4	Day of month (1..31)
5	Month (1..12)
6	Year (0..255) 0=1900

11.4. Liquiline unit code table

The following unit code table is used by commands 167, 168, 224, 225, 238 and 239. All other commands use the HART standard unit codes.

Code	Code Hex	Description	Unit
0	00	None	-
1	01	Conductivity temperature compensation unit	1/K
2	02	Nanoampereseconds	nAs
3	03	Microampereseconds	µAs
4	04	Ampereseconds	As
5	05	Parts per billion	ppb
6	06	Parts per million	ppm
7	07	Percent	%
8	08	Percent saturation	%Sat
9	09	Per millimeter	1/mm
10	0A	Per centimeter	1/cm
11	0B	Per meter	1/m
12	0C	Grams per kilogram	g/kg
13	0D	Parts per million volume	ppmVol
14	0E	Percent volume	%Vol
15	0F	Percent per kelvin	%/K
16	10	Percent per microvolt	%/µV
17	11	Percent per millivolt	%/mV
18	12	Percent per volt	%/V
19	13	Microsiemens	µS
20	14	Millisiemens	mS
21	15	Siemens	S
22	16	Picoamperes	pA
23	17	Nanoamperes	nA
24	18	Microamperes	µA
25	19	Milliamperes	mA
26	1A	Amperes	A
27	1B	Nanoamperes per milligram per liter	nA/(mg/l)
28	1C	Amperes per kilogram per cubic meter	A/(kg/m^3)
29	1D	Amperes per pascal	A/Pa
30	1E	Picoamperes per hectopascal	pA/hPa
31	1F	Amperes per hectopascal	A/hPa
32	20	Degree	°
33	21	Formazine nephelometric units	FNU
34	22	Nephelometric turbidity units	NTU
35	23	Hertz	Hz
36	24	One per minute	1/min
37	25	One per hour	1/h
38	26	One per day	1/d
39	27	Kilobytes	kB
40	28	Millimeters	mm
41	29	Centimeters	cm
42	2A	Decimeters	dm
43	2B	Meters	m
44	2C	Kilometers	km
45	2D	Grams per milliliter	g/ml
46	2E	Micrograms per liter	µg/l
47	2F	Milligrams per liter	mg/l

Code	Code Hex	Description	Unit
48	30	Grams per liter	g/l
49	31	Kilogram per liter	kg/l
50	32	Kilograms per cubic meter	kg/m^3
51	33	Parts per billion @ density 1	ppb
52	34	Parts per million @ density 1	ppm
53	35	pH	pH
54	36	Millimeters per second	mm/s
55	37	Millimeters per minute	mm/min
56	38	Millimeters per hour	mm/h
57	39	Millimeters per day	mm/d
58	3A	Pascals	Pa
59	3B	Hectopascals	hPa
60	3C	Millibars	mbar
61	3D	Pascals per ampere	Pa/A
62	3E	Personal salinity unit	psu
63	3F	Milliohms	mΩ
64	40	Ohms	Ω
65	41	Kiloohms	kΩ
66	42	Megaohms	MΩ
67	43	Gigaohms	GΩ
68	44	rH	rH
69	45	Microsiemens per millimeter	µS/mm
70	46	Nanosiemens per centimeter	nS/cm
71	47	Microsiemens per centimeter	µS/cm
72	48	Millisiemens per centimeter	mS/cm
73	49	Siemens per centimeter	S/cm
74	4A	Microsiemens per meter	µS/m
75	4B	Millisiemens per meter	mS/m
76	4C	Siemens per meter	S/m
77	4D	Kilosiemens per meter	kS/m
78	4E	Megasiemens per meter	MS/m
79	4F	Nanoohmmeters	nΩm
80	50	Microohmmeters	µΩm
81	51	Milliohmmeters	mΩm
82	52	Ohmmeters	Ωm
83	53	Kiloohmmeters	kΩm
84	54	Megaohmmeters	MΩm
85	55	Gigaohmmeters	GΩm
86	56	Ohmcentimeters	Ωcm
87	57	Kiloohmcentimeters	kΩcm
88	58	Megaohmcentimeters	MΩcm
89	59	Degrees Celsius	°C
90	5A	Kelvins	K
91	5B	Delta degrees Celsius	°C
92	5C	Delta kelvins	K
93	5D	Microseconds	µs
94	5E	Milliseconds	ms
95	5F	Seconds	s
96	60	Minutes	min
97	61	Hours	h
98	62	Days	d
99	63	Weeks	week
100	64	Month	month

Code	Code Hex	Description	Unit
101	65	Liters per second	l/s
102	66	Cubic meters per second	m^3/s
103	67	Liters per minute	l/min
104	68	Cubic meters per minute	m^3/min
105	69	Liters per hour	l/h
106	6A	Cubic meters per hour	m^3/h
107	6B	Liters per day	l/d
108	6C	Cubic meters per day	m^3/d
109	6D	Microvolts	µV
110	6E	Millivolts	mV
111	6F	Volts	V
112	70	Millivolts per percent	mV/%
113	71	Volts per percent	V/%
114	72	Millivolts per pH	mV/pH
115	73	Volts per pH	V/pH
116	74	Milliliters	ml
117	75	Liters	l
118	76	Cubic meters	m^3
119	77	Inch	in
120	78	Feet	ft
121	79	Yards	yd
122	7A	Miles	mi
123	7B	Inch per second	in/s
124	7C	Inch per minute	in/min
125	7D	Inch per hour	in/h
126	7E	Inch per day	in/d
127	7F	Degrees Fahrenheit	°F
128	80	Delta degrees Fahrenheit	°F
129	81	Gallons per second	gal/s
130	82	Cubic feet per second	(cu ft)/s
131	83	Megagallons per second	Mgal/s
132	84	Gallons per minute	gal/min
133	85	Cubic feet per minute	(cu ft)/min
134	86	Megagallons per minute	Mgal/min
135	87	Gallons per hour	gal/h
136	88	Cubic feet per hour	(cu ft)/h
137	89	Megagallons per hour	Mgal/h
138	8A	Gallons per day	gal/d
139	8B	Cubic feet per day	(cu ft)/d
140	8C	Megagallons per day	Mgal/d
141	8D	Gallons	gal
142	8E	Cubic feet	cu ft
143	8F	Mol per cubic meter	mol/m^3
144	90	Mol per liter	mol/l
145	91	Percent transferrin saturation	%TS
146	92	Bars	bar
147	93	Nanometers	nm
148	94	Meters per second	m/s
149	95	Feet per second	ft/s
150	96	Megabytes	MB
151	97	Bytes	B
152	98	Gigabytes	GB
153	99	Picoamperes per milligram per liter	pA/(mg/l)

Code	Code Hex	Description	Unit
154	9A	Kilograms per mol	kg/mol
155	9B	Grams per mol	g/mol
156	9C	Formazine turbidity unit	FTU
157	9D	Turbidity formazine unit	TE/F
158	9E	American society of brewing chemists unit	ASBC
159	9F	European brewing convention unit	EBC
160	A0	Dough	度
161	A1	Milligrams per liter percent	mg/l
162	A2	Absorbance unit	AU
163	A3	Percent transmission	%T
164	A4	Optical density	OD
165	A5	Milliliters per minute	mm/min
166	A6	Equivalent	eq
167	A7	Equivalent per cubic meter	eq/m^3
168	A8	Equivalent per liter	eq/l
169	A9	Equivalent per gallon	eq/gal
170	AA	Celsius per second	°C/s
171	AB	Celsius per minute	°C/min
172	AC	Formazine attenuation unit	FAU
173	AD	Ampere hours	Ah
174	AE	Meters per hour	m/h
175	AF	Per pascal	1/Pa
176	B0	Per hectopascal	1/hPa
177	B1	Per megapascal	1/MPa
254	FE	User unit	(String)

11.5. Manufacturer specific unit codes

Code	Code Hex	Description	Unit
240	F0	Mol per liter	mol/l
241	F1	Nephelometric turbidity units	NTU
242	F2	Megaohmcentimeters	MΩcm
243	F3	One per meter	1/m
247	F7	rH	rH

12. Performance

12.1. Sampling rates

Typical sampling rates are shown in the following table:

All sensors sample: ≥1 per second
All device variables digital value calculation: ≥1 per second
All analog outputs update: ≥1 per second

12.2. Power up

On power up, the transmitter has to initialize itself, which takes up to 2 minutes. During this period, the device will not respond to HART commands.
As soon as the measurement screen appears on the display Liquiline is ready to communicate via HART, no matter if there are errors present or not.
Fixed current mode is cancelled by power loss.

12.3. Reset

Command 42 ("Device reset") causes the device to reset. The resulting restart is identical to the normal power up sequence. It will take about 2 minutes until Liquiline is back online.

12.4. Self test

This field device does not support a self test.

12.5. Command response times

Minimum:	0ms
Typical:	60ms
Maximum:	250ms

12.6. Busy and delayed response

Busy and delayed responses will not occur.

12.7. Long messages

The largest data field used with universal and common practice commands is in the response to command 9:
71 bytes, including the two status bytes.
The largest data field used with manufacturer specific commands can be theoretically 255 bytes including the two status bytes.

12.8. Non volatile memory

The device‘s configuration parameters are saved into a flash memory. New data is written to this memory by a special flash handler. Data will not be saved immediately on execution of a write command, but approximately 5 seconds later. Data consistency is always ensured.

12.9. Operating modes

Fixed current mode is implemented, using command 40. This mode is cleared by power loss or reset.

12.10. Write protection

Write protection is not provided.

13. Annex A: Capability checklist

Manufacturer, model and revision:	Endress+Hauser Liquiline CM44x - Revision 2
Device type:	Transmitter
HART revision:	7.2
Device description available:	Yes
Number and type of sensors:	Up to 8 digital sensors of different type
Number and type of actuators:	0
Number and type of host side signals:	Up to 8 x 4..20 mA analog
Number of device variables:	32
Number of dynamic variables:	4
Mappable dynamic variables:	Yes / 3
Number of common practice commands:	19
Number of device specific commands:	13
Bits of additional device status:	63
Alternative operating modes:	No
Burst mode:	No
Write protection:	No

14. Annex B: Default configuration

Please refer to the operating instructions.

15. Annex C: Revision history

Revision 1, 08-Dec-2010:	Initial revision
Revision 2, 21-Jun-2011:	Command 48 error mapping table corrected Sensor measurement values added
Revision 3, 21-Nov-2011:	Ranges revised Units revised Conductivity sensor values revised
Revision 4, 25-Nov-2013:	Added new errors to command 48 error mapping table Added new E+H units
Revision 5, 29-Jul-2019:	Device revision 2
Revision 6, 01-Dec-2023	Added parameter references

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Document: E+H Liquiline CM44x LIT-18, Revision 6, SD01187C/07/EN/04.23, 71640221