

Special Documentation

Liquiline Control CDC90

Data transmission via PROFIBUS DP

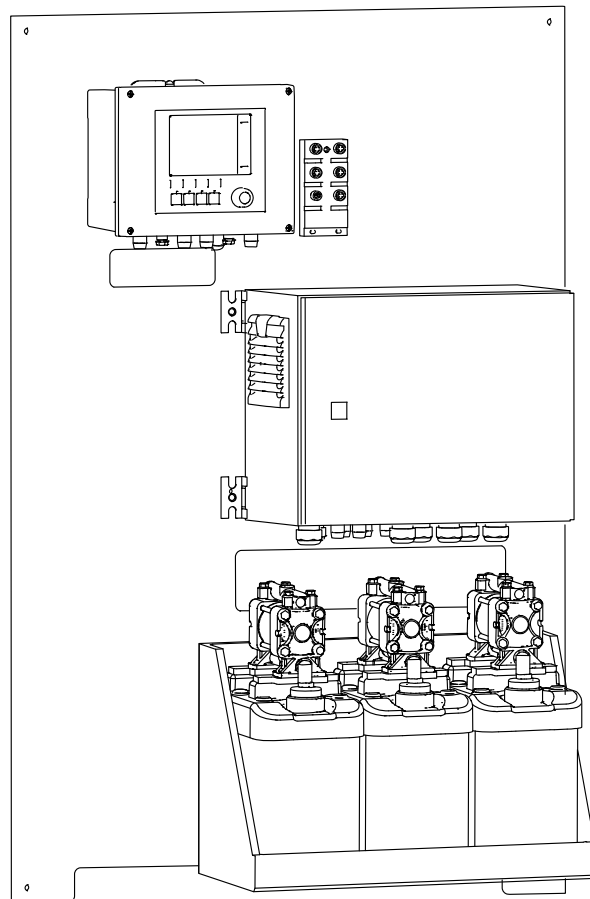


Table of contents

1	Notes	4
1.1	Using the supplementary document	4
1.2	Abbreviations	4
2	Installation and wiring	5
2.1	IP configuration between CDC90 and gateway	5
2.2	IP configuration between gateway and process control system (PCS)	6
3	Commissioning	7
3.1	Notes	7
3.2	GSD file	7
3.3	PROFIBUS address	7
3.4	Selecting PROFIBUS DP	7
3.5	Diagnostics	8
4	Parameter tables	9
4.1	Output parameters	9
4.2	Input parameters	10

1 Notes

1.1 Using the supplementary document

This supplementary documentation must be used only in conjunction with a Liquiline Control CDC90 with PROFIBUS DP.

This supplementary documentation is an integral part of the Operating Instructions and provides additional information on the use of the device with PROFIBUS DP.

More information can be found in the following Operating Instructions:

Operating Instructions CDC90 [BA01707C](#)

This document is aimed at individuals who are incorporating the device into a PROFIBUS DP network.

It is assumed that the reader has basic knowledge in this area.

More detailed information on PROFIBUS technology and the PA Profile can be found, for example, in the PROFIBUS® DP/PA Guidelines for Planning and Commissioning: Field Communication

In addition, various guides for the installation and commissioning of a PROFIBUS DP network are available from the PROFIBUS User Organization (PI):

<https://www.profibus.com/download/installation-guide/>

1.2 Abbreviations

PI	PROFIBUS and PROFINET International (www.profibus.com)
n/a	Not applicable
NaN	Not a number (IEEE-754, 7Fh A0h 00h 00h)
ENP	Electronic name plate
I&M	Identification & Maintenance
AI	Analog Input (PA Profile function block)
DI	Discrete Input (PA Profile function block)
AO	Analog Output (PA Profile function block)
DO	Discrete Output (PA Profile function block)
DCS	Distributed Control System

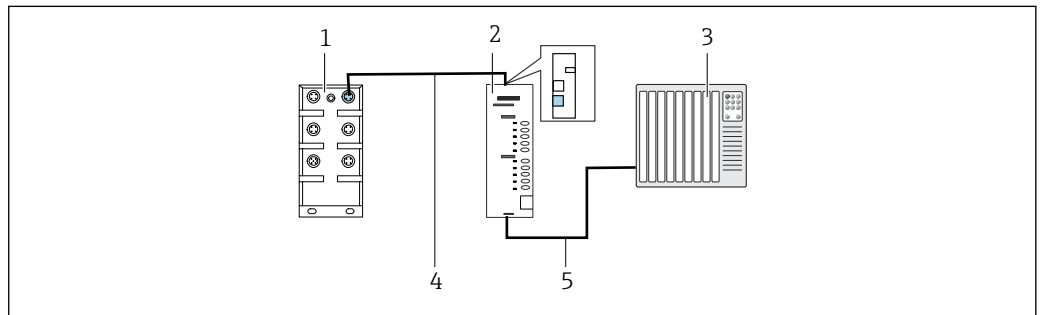
2 Installation and wiring

Installation and wiring is described in the Operating Instructions of Liquiline Control CDC90.

The Anybus X gateway connects a Modbus TCP network to a PROFIBUS DP network, thereby enabling the seamless flow of information between the CDC90 and a control system.

Only one gateway is required for a one-channel and two-channel system and is included with the order. For the installation and wiring procedure, please refer to the Gateway Installation Instructions provided with the Liquiline Control CDC90 upon delivery.

The gateway must be installed externally.



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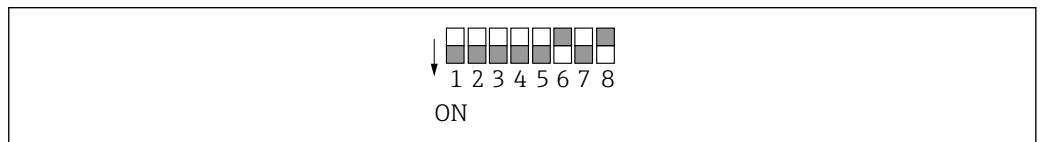
1 Communication connection

- 1 Ethernet switch on CDC90
- 2 Gateway
- 3 Process control system PCS
- 4 Ethernet cable, CDC90/gateway communication
- 5 Communication connection, gateway/process control system PCS

1. For connection to the CDC90, connect the Ethernet cable (4) above the gateway.
2. Connect the end piece to the Ethernet switch (1).
3. For connection to the PCS, connect the cable for communication (5) below the gateway.
4. Connect the end piece to the PCS (3).

2.1 IP configuration between CDC90 and gateway

1. Mount the Modbus TCP interface on the gateway from above. → 1, 5
2. Configure the gateway with the IP address 192.168.0.5.



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2 IP address for PROFIBUS DP

2.2 IP configuration between gateway and process control system (PCS)

1. When connecting the power supply, first make sure that all switches are in the upper (zero) position.
 - ↳ The switch sets the binary value of the last byte of the IP address (192.168.0.1-254).
2. Use Anybus IPconfig to set all IP addresses outside of this range.
https://cdn.hms-networks.com/docs/librariesprovider7/default-document-library/manuals-design-guides/hms-scm-1202-141.pdf?sfvrsn=ba254fd7_14

3 Commissioning

3.1 Notes

Follow the Installation Guide provided by the PROFIBUS User Organization. You can download the electronic version free of charge from the PNO website.

<http://www.profibus.com/download/installation-guide/>

3.2 GSD file

The file is available from the following sources:

German

<https://www.de.endress.com/de/messgeraete-fuer-die-prozesstechnik/fluessigkeitsanalyse-produktuebersicht/pH-elektrode-automatische-reinigung-kalibrierung-cdc90>

English

<https://www.endress.com/en/Field-instruments-overview/liquid-analysis-product-overview/pH-sensor-automatic-cleaning-calibration-cdc90>

► Upload the following GSD file to the PCS system:

"HMSB1831.gsd"

The following manufacturer-specific GSD files are available:

<https://www.anybus.com/de/support/file-doc-downloads/x-gateway-specific/?ordercode=AB7634>

We recommend you use the manufacturer-specific GSD file, as it is optimally adapted to the properties of the gateway.


3.3 PROFIBUS address

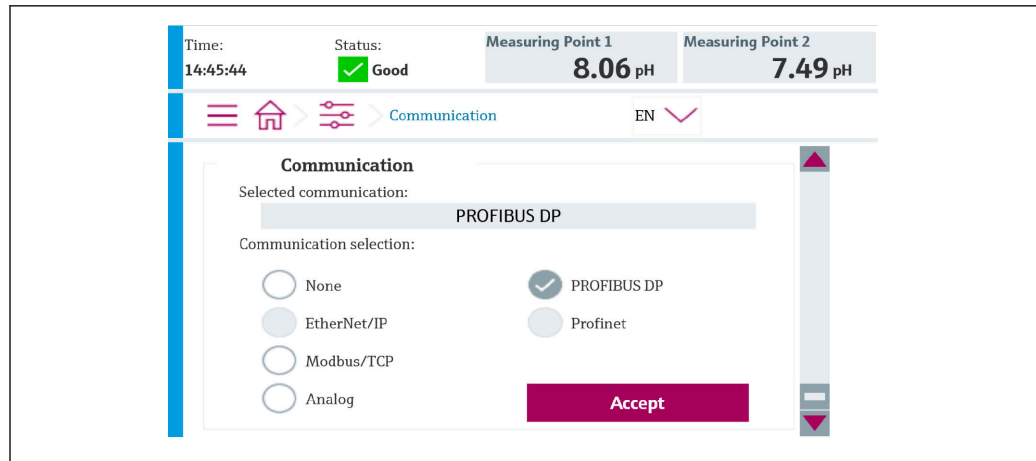
- Addresses 0 to 2 are usually used for PROFIBUS masters.
- Each PROFIBUS device requires a unique address.
- Hardware addressing is enabled if a valid address is set at the address DIL switches.
- A change to the address DIL switches takes effect once the device is restarted.
- The default gateway IP address for the Modbus TCP is 192.168.0.5 and must not be modified.

3.4 Selecting PROFIBUS DP

To specify which fieldbus communication method is used to send commands, go to:

1. Select the PROFIBUS DP protocol.
2. Press **Accept** to confirm.

 The values cannot be read until this setting has been made.



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i Only one fieldbus communication is used to send commands to the Liquiline Control CDC90 or to read the values.

Once the protocol has been enabled, but the connection to the control station has not been detected or established, an Out of Spec message 1003 is reported: communication to the distributed control system is interrupted.

3.5 Diagnostics

Diagnostics information is provided in the Gateway Operating Instructions.

4 Parameter tables

Variables	R/W	Bytes	Bytes	Total bytes
System controller	w	00 to 13	14	14 Outputs
System Information	R	00 to 13	14	240 Inputs
Calibration report	R	14 to 63	50	
Channel 1 information	R	64 to 111	48	
Channel 2 information	R	112 to 159	48	
IO Feedback	R	160 to 239	80	

4.1 Output parameters

The output data modules are used as command parameters to start programs.

The program IDs can be viewed in the "CDC90 program configuration tool" or found on the local display under the User Guidance / Programs menu.

Program control

Parameter	Description	Data type	Bytes
OpMode-Control	2 = OpMode is automatic 3 = OpMode is remote	Unsigned16	0, 1
ProgramSelection	Select the program via the program ID	Unsigned16	6, 7
ProgramControl	0 = No program started 1 = Start selected program 2 = Pause active program (currently not supported) 3 = Quit active program	Unsigned16	8, 9


ID	Program	Seq. ID	Channel
801	Prg1	1001	1
802	Prg2	1002	1
803	Prg3	1001	2
804	Prg4	1002	2
805	Prg5	1009	1

3 Overview of the programs

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Programs			
ID	Name	Sequence	Channel
801	Prg1	Service	1
802	Prg2	Measure	1
803	Prg3	Service	2
804	Prg4	Measure	2
805			
806			
807			
808			
809			
810			

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 4 Programs

4.2 Input parameters

4.2.1 System information parameters

Parameter	Description	Data type	Bytes
OpMode-State	0 = OpMode is setup 1 = OpMode is manual 2 = OpMode is automatic 3 = OpMode is remote	Unsigned16	0, 1
Alarm-State	0 = CDC90 has no alarm 1 = CDC90 has an error alarm 2 = CDC90 has a function control alarm 3 = CDC90 has a maintenance alarm 4 = CDC90 has an out of specification alarm	Unsigned16	2, 3
Alarm-Number	Number of last diagnostic message to appear	Unsigned16	4, 5
ProgramSelection-State	Reflects the ProgramSelection, if valid.	Unsigned16	6, 7
ProgramControl-State	0 = No program running 1 = Selected program running 2 = Active program paused (currently not supported) 3 = Active program stopped 4 = Selected program canceled 5 = Selected program quit	Unsigned16	8, 9
Current Step	Active program step	Unsigned16	10, 11
Program-Result	0 = No result 1 = Selected program completed successfully 2 = Selected program not completed successfully	Unsigned16	12, 13

4.2.2 Calibration results

Calibration results for measuring point 1 and for measuring point 2:

Sensor	Calibration result measured value 1	Calibration result measured value 2	Calibration result measured value 3	Calibration result measured value 4	Calibration result measured value 5
pH glass	Current raw value mV	Current measured value pH	Temperature °C	Slope mV/pH	Zero point pH
pH ISFET	Current raw value mV	Current measured value pH	Temperature °C	Slope mV/pH	Zero point pH

Sensor	Calibration result measured value 1	Calibration result measured value 2	Calibration result measured value 3	Calibration result measured value 4	Calibration result measured value 5
ORP	Current raw value mV	Current measured value pH (Raw value+Offset)	Temperature °C	Offset value mV	No data
pH/ORP	pH calibration				
	Current raw value mV	Current measured value pH	Temperature °C	Slope mV/pH	Zero point pH
	ORP calibration				
	Current raw value mV	Current measured value pH (Raw value+Offset)	Temperature °C	Offset value mV	No data

4.2.3 Calibration parameters

Parameter	Description	Data type	Bytes
CalibrationResult1-Value		REAL	14, 15, 16, 17
CalibrationResult1-Unit	0 = No unit 7 = % 23 = nA 25 = mA 53 = pH 59 = hPa 65 = kΩ 66 = MΩ 89 = °C 90 = K 110 = mV 114 = mV/pH 127 = °F	Unsigned16	18, 19
CalibrationResult1-Valid	0 = OK 1 = Busy 2 = Local calibration active 3 = Sensor not configured 4 = Sensor not supported 5 = Invalid entry 6 = Calibration error	Unsigned16	20, 21
CalibrationResult1-Type	0 = No calibration type defined 1 = Raw value 2 = Measured value 3 = Temperature 4 = Offset 5 = Medium 1 6 = Measured value 1 7 = Medium 2 8 = Measured value 2 9 = Slope 10 = Zero point 11 = Delta slope 12 = Delta zero point	Unsigned16	22, 23
CalibrationResult2-Value		REAL	24, 25, 26, 27

Parameter	Description	Data type	Bytes
CalibrationResult2-Unit	0 = No unit 7 = % 23 = nA 25 = mA 53 = pH 59 = hPa 65 = kΩ 66 = MΩ 89 = °C 90 = K 110 = mV 114 = mV/pH 127 = °F	Unsigned16	28, 29
CalibrationResult2-Valid	0 = OK 1 = Busy 2 = Local calibration active 3 = Sensor not configured 4 = Sensor not supported 5 = Invalid entry 6 = Calibration error	Unsigned16	30, 31
CalibrationResult2-Type	0 = No calibration type defined 1 = Raw value 2 = Measured value 3 = Temperature 4 = Offset 5 = Medium 1 6 = Measured value 1 7 = Medium 2 8 = Measured value 2 9 = Slope 10 = Zero point 11 = Delta slope 12 = Delta zero point	Unsigned16	32, 33
CalibrationResult3-Value		REAL	34, 35, 36, 37
CalibrationResult3-Unit	0 = No unit 7 = % 23 = nA 25 = mA 53 = pH 59 = hPa 65 = kΩ 66 = MΩ 89 = °C 90 = K 110 = mV 114 = mV/pH 127 = °F	Unsigned16	38, 39
CalibrationResult3-Valid	0 = OK 1 = Busy 2 = Local calibration active 3 = Sensor not configured 4 = Sensor not supported 5 = Invalid entry 6 = Calibration error	Unsigned16	40, 41

Parameter	Description	Data type	Bytes
CalibrationResult3-Type	0 = No calibration type defined 1 = Raw value 2 = Measured value 3 = Temperature 4 = Offset 5 = Medium 1 6 = Measured value 1 7 = Medium 2 8 = Measured value 2 9 = Slope 10 = Zero point 11 = Delta slope 12 = Delta zero point	Unsigned16	42, 43
CalibrationResult4-Value		REAL	44, 45, 46, 47
CalibrationResult4-Unit	0 = No unit 7 = % 23 = nA 25 = mA 53 = pH 59 = hPa 65 = kΩ 66 = MΩ 89 = °C 90 = K 110 = mV 114 = mV/pH 127 = °F	Unsigned16	48, 49
CalibrationResult4-Valid	0 = OK 1 = Busy 2 = Local calibration active 3 = Sensor not configured 4 = Sensor not supported 5 = Invalid entry 6 = Calibration error	Unsigned16	50, 51
CalibrationResult4-Type	0 = No calibration type defined 1 = Raw value 2 = Measured value 3 = Temperature 4 = Offset 5 = Medium 1 6 = Measured value 1 7 = Medium 2 8 = Measured value 2 9 = Slope 10 = Zero point 11 = Delta slope 12 = Delta zero point	Unsigned16	52, 53
CalibrationResult5-Value		REAL	54, 55, 56, 57
CalibrationResult5-Unit	0 = No unit 7 = % 23 = nA 25 = mA 53 = pH 59 = hPa 65 = kΩ 66 = MΩ 89 = °C 90 = K 110 = mV 114 = mV/pH 127 = °F	Unsigned16	58, 59

Parameter	Description	Data type	Bytes
CalibrationResult5-Valid	0 = OK 1 = Busy 2 = Local calibration active 3 = Sensor not configured 4 = Sensor not supported 5 = Invalid entry 6 = Calibration error	Unsigned16	60, 61
CalibrationResult5-Type	0 = No calibration type defined 1 = Raw value 2 = Measured value 3 = Temperature 4 = Offset 5 = Medium 1 6 = Measured value 1 7 = Medium 2 8 = Measured value 2 9 = Slope 10 = Zero point 11 = Delta slope 12 = Delta zero point	Unsigned16	62, 63

4.2.4 Measured value units of the sensors

Information about measuring point 1 and measuring point 2

Sensor	Measured value 1	Measured value 2	Measured value 3	Measured value 4	Measured value 5
pH glass	Current measured value pH	Raw value mV	Glass impedance M Ω	Temperature $^{\circ}$ C	----
pH ISFET	Current measured value pH	Raw value mV	Leak current nA	Temperature $^{\circ}$ C	----
ORP	ORP mV	ORP %	----	Temperature $^{\circ}$ C	----
pH/ORP	Current measured value pH	ORP mV	Raw value mV	Temperature $^{\circ}$ C	Reference impedance k Ω

4.2.5 Information about measuring point 1

Parameter	Description	Data type	Bytes
Channel1-Activation	0 = Active 1 = Not active (only read in at restart)	Unsigned16	64, 65
Channel1-Position	0 = Assembly in service position 1 = Assembly in measure position	Unsigned16	66, 67
Channel1-Hold	0 = Not active 1 = Active	Unsigned16	68, 69
Channel1-ConnectedSensorType	0 = None 3 = pH glass 5 = pH ISFET 8 = ORP 18 = pH/ORP	Unsigned16	70, 71
Channel1-Value1		REAL	72, 73, 74, 75

Parameter	Description	Data type	Bytes
Channel1-Value1-Unit	0 = No unit 7 = % 23 = nA 25 = mA 53 = pH 59 = hPa 65 = kΩ 66 = MΩ 89 = °C 90 = K 110 = mV 114 = mV/pH 127 = °F	Unsigned16	76, 77
Channel1-Value1-Valid	0 = Good 1 = Uncertain 2 = Bad 3 = Not assigned	Unsigned16	78, 79
Channel1-Value2		REAL	80, 81, 82, 83
Channel1-Value2-Unit	0 = No unit 7 = % 23 = nA 25 = mA 53 = pH 59 = hPa 65 = kΩ 66 = MΩ 89 = °C 90 = K 110 = mV 114 = mV/pH 127 = °F	Unsigned16	84, 85
Channel1-Value2-Valid	0 = Good 1 = Uncertain 2 = Bad 3 = Not assigned	Unsigned16	86, 87
Channel1-Value3		REAL	88, 89, 90, 91
Channel1-Value3-Unit	0 = No unit 7 = % 23 = nA 25 = mA 53 = pH 59 = hPa 65 = kΩ 66 = MΩ 89 = °C 90 = K 110 = mV 114 = mV/pH 127 = °F	Unsigned16	92, 93
Channel1-Value3-Valid	0 = Good 1 = Uncertain 2 = Bad 3 = Not assigned	Unsigned16	94, 95
Channel1-Value4		REAL	96, 97, 98, 99

Parameter	Description	Data type	Bytes
Channel1-Value4-Unit	0 = No unit 7 = % 23 = nA 25 = mA 53 = pH 59 = hPa 65 = kΩ 66 = MΩ 89 = °C 90 = K 110 = mV 114 = mV/pH 127 = °F	Unsigned16	100, 101
Channel1-Value4-Valid	0 = Good 1 = Uncertain 2 = Bad 3 = Not assigned	Unsigned16	102, 103
Channel1-Value5		REAL	104, 105, 106, 107
Channel1-Value5-Unit	0 = No unit 7 = % 23 = nA 25 = mA 53 = pH 59 = hPa 65 = kΩ 66 = MΩ 89 = °C 90 = K 110 = mV 114 = mV/pH 127 = °F	Unsigned16	108, 109
Channel1-Value5-Valid	0 = Good 1 = Uncertain 2 = Bad 3 = Not assigned	Unsigned16	110, 111

4.2.6 Information about measuring point 2

Parameter	Description	Data type	Bytes
Channel2-Activation	0 = Active 1 = Not active (only read in at restart)	Unsigned16	112, 113
Channel2-Position	0 = Assembly in service position 1 = Assembly in measure position	Unsigned16	114, 115
Channel2-Hold	0 = Not active 1 = Active	Unsigned16	116, 117
Channel2-ConnectedSensorType	0 = None 3 = pH glass 5 = pH ISFET 8 = ORP 18 = pH/ORP	Unsigned16	118, 119
Channel2-Value1		REAL	120, 121, 122, 123

Parameter	Description	Data type	Bytes
Channel2-Value1-Unit	0 = No unit 7 = % 23 = nA 25 = mA 53 = pH 59 = hPa 65 = kΩ 66 = MΩ 89 = °C 90 = K 110 = mV 114 = mV/pH 127 = °F	Unsigned16	124, 125
Channel2-Value1-Valid	0 = Good 1 = Uncertain 2 = Bad 3 = Not assigned	Unsigned16	126, 127
Channel2-Value2		REAL	128, 129, 130, 131
Channel2-Value2-Unit	0 = No unit 7 = % 23 = nA 25 = mA 53 = pH 59 = hPa 65 = kΩ 66 = MΩ 89 = °C 90 = K 110 = mV 114 = mV/pH 127 = °F	Unsigned16	132, 133
Channel2-Value2-Valid	0 = Good 1 = Uncertain 2 = Bad 3 = Not assigned	Unsigned16	134, 135
Channel2-Value3		REAL	136, 137, 138, 139
Channel2-Value3-Unit	0 = No unit 7 = % 23 = nA 25 = mA 53 = pH 59 = hPa 65 = kΩ 66 = MΩ 89 = °C 90 = K 110 = mV 114 = mV/pH 127 = °F	Unsigned16	140, 141
Channel2-Value3-Valid	0 = Good 1 = Uncertain 2 = Bad 3 = Not assigned	Unsigned16	142, 143
Channel2-Value4		REAL	144, 145, 146, 147

Parameter	Description	Data type	Bytes
Channel2-Value4-Unit	0 = No unit 7 = % 23 = nA 25 = mA 53 = pH 59 = hPa 65 = kΩ 66 = MΩ 89 = °C 90 = K 110 = mV 114 = mV/pH 127 = °F	Unsigned16	148, 149
Channel2-Value4-Valid	0 = Good 1 = Uncertain 2 = Bad 3 = Not assigned	Unsigned16	150, 151
Channel2-Value5		REAL	152, 153, 154, 155
Channel2-Value5-Unit	0 = No unit 7 = % 23 = nA 25 = mA 53 = pH 59 = hPa 65 = kΩ 66 = MΩ 89 = °C 90 = K 110 = mV 114 = mV/pH 127 = °F	Unsigned16	156, 157
Channel2-Value5-Valid	0 = Good 1 = Uncertain 2 = Bad 3 = Not assigned	Unsigned16	158, 159

4.2.7 IO feedbacks

Parameter	Description	Data type	Bytes
Canister1	0 = Empty 1 = Full, not empty	Unsigned16	160, 161
PressureSwitch	0 = Not active 1 = Active	Unsigned16	162, 163
Canister3	0 = Empty 1 = Full, not empty	Unsigned16	164, 165
Canister2	0 = Empty 1 = Fill, not empty	Unsigned16	166, 167
Assembly1 Measure	0 = Off 1 = On	Unsigned16	168, 169
Assembly1 Service	0 = Off 1 = On	Unsigned16	170, 171
WaterValve	0 = Off 1 = On	Unsigned16	172, 173
AirValve	0 = Off 1 = On	Unsigned16	174, 175
Pump1	0 = Off 1 = On	Unsigned16	176, 177
Pump2			178, 179

Parameter	Description	Data type	Bytes
Pump3			180, 181
CustomValve1	0 = Off 1 = On	Unsigned16	182, 183
ChannelSwitch1	0 = Off 1 = On	Unsigned16	184, 185
ChannelSwitch2	0 = Off 1 = On	Unsigned16	186, 187
Assembly2 Measure	0 = Off 1 = On	Unsigned16	188, 189
Assembly2 Service	0 = Off 1 = On	Unsigned16	190, 191
CustomValve2	0 = Off 1 = On	Unsigned16	192, 193
CustomValve3	0 = Off 1 = On	Unsigned16	194, 195
CustomValve4	0 = Off 1 = On	Unsigned16	196, 197
CustomValve5	0 = Off 1 = On	Unsigned16	198, 199
CustomDo1	0 = Off 1 = On	Unsigned16	200, 201
CustomDo2			202, 203
CustomDo3			204, 205
CustomDo4			206, 207
CustomDo5			208, 209
CustomDo6			210, 211
CustomDo7			212, 213
CustomDo8			214, 215
CustomDo9			216, 217
CustomDo10			218, 219
CustomDo11			220, 221
CustomDo12			222, 223
CustomDI1	0 = Off 1 = On	Unsigned16	224, 225
CustomDI2			226, 227
CustomDI3			228, 229
CustomDI4			230, 231
CustomDI5			232, 233
CustomDI6			234, 235
CustomDI7			236, 237
CustomDI8			238, 239



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