Special Documentation
Liquiline Control CDC90

Data transmission via Modbus TCP

Endress+Hauser [EH]

People for Process Automation
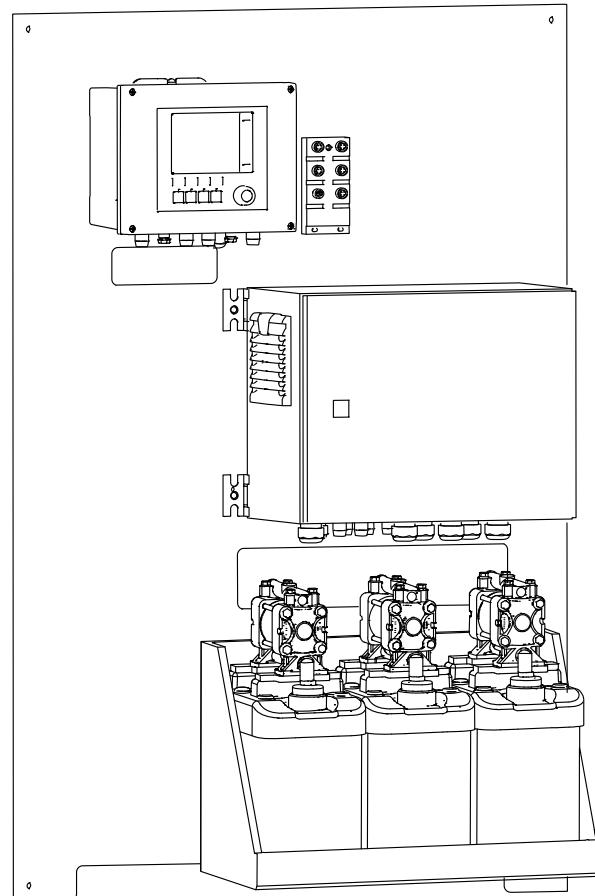
Table of contents

1 Notes

1.1 Using the supplementary document

This supplementary documentation must be used only in conjunction with a Liquiline Control CDC90 with Modbus TCP.

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

More information can be found in the following Operating Instructions:

Operating Instructions CDC90 BA01707C

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

Further information on Modbus technology can be found, for example, on the website: www.modbus.org

1.2 Abbreviations

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 , 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.

3 Commissioning

3.1 Settings

The network settings (IP address, subnet mask and gateway) of the device must first be configured before a connection to the Liquiline Control CDC90 can be established.

The settings depend on the network into which the device is to be incorporated.

3.1.1 Factory setting

Setting	Factory setting
IP address	192.168.0.1 Valid IPv4 address of CDC90
Netmask	255.255.255.0 Valid subnet mask
TCP port (HTTP)	80
TCP port (Modbus TCP)	502

3.1.2 Setting the static IP address

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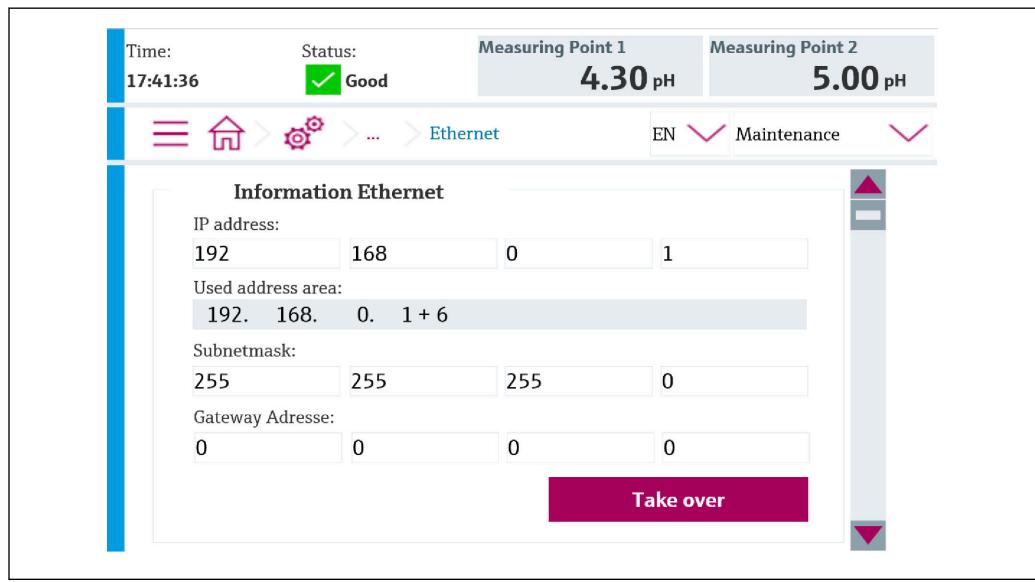
1. Under: Setup/General settings/Advanced settings/Ethernet/Settings, set the values as indicated in the graphic below.

2. Change the settings for the IP address and netmask.

3. Click **Accept** to save the settings.

4. Wait 20 seconds until the measured values are visible again.

3.2 Checking the connection

The Liquiline Control CDC90 implements the ICMP protocol. The "ping" command can be used to check whether the Liquiline Control CDC90 can be reached via the network.
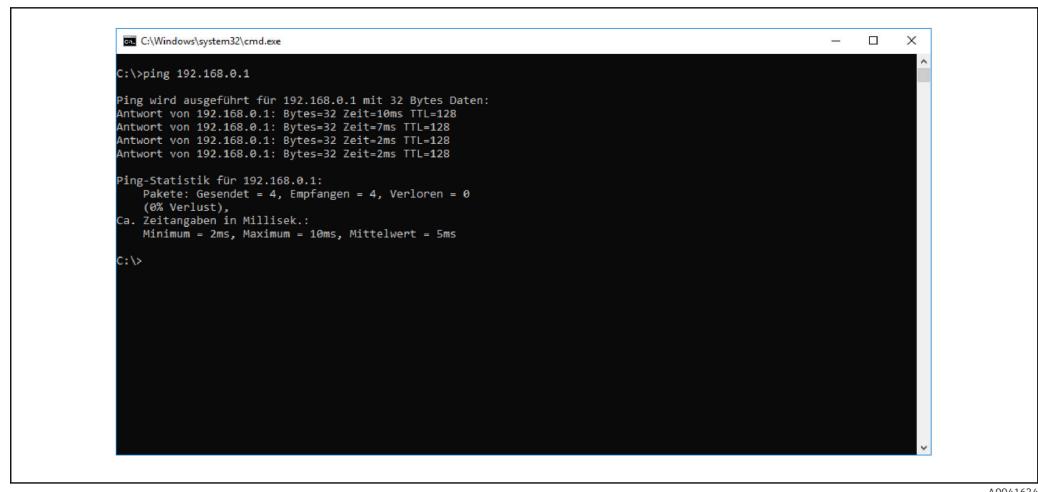
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3.3   Selecting Modbus TCP

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

1. Select the Modbus TCP protocol.

2. Press **Accept** to confirm.

[i] The values cannot be read until this setting has been made.
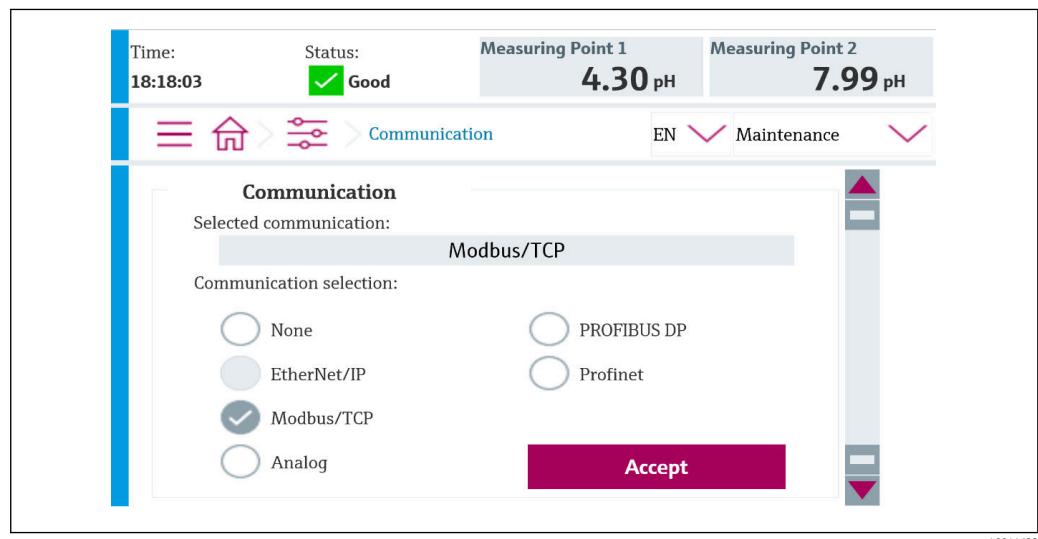
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[i] Only one fieldbus communication is used to send commands to the Liquiline Control CDC90 or to read the values.

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.

4   Parameter tables

Variables	R/W	Register
System controller	w	00 to 06
System Information	R	00 to 09
Calibration report	R	10 to 54
Channel 1 information	R	60 to 75
Channel 2 information	R	100 to 153
IO Feedback	R	200 to 253
Measuring point name	R	900 to 961
Device information	R	1000 to 1087

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

Register	Parameter	Description	Data type
0	OpMode-Control	2 = OpMode is automatic 3 = OpMode is remote	USINT
3	ProgramSelection	Select the program via the program ID	UINT
4	ProgramControl	0 = No program started 1 = Start selected program 2 = Pause active program (currently not supported) 3 = Quit active program	USINT
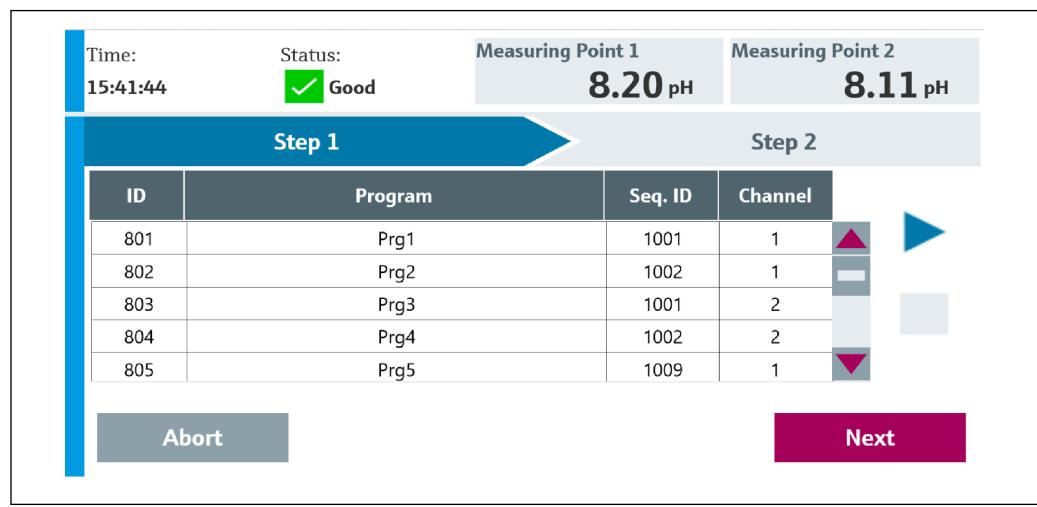
🖻 *1   Overview of the programs*

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🖻 *2   Programs*

4.2   Input parameters

4.2.1   System information parameters

Register	Parameter	Description	Data type
0	OpMode-State	0 = OpMode is setup 1 = OpMode is manual 2 = OpMode is automatic 3 = OpMode is remote	USINT
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	USINT
2	Alarm-Number	Number of an alarm	UINT
3	ProgramSelection-State	Reflects the ProgramSelection, if valid.	UINT
4	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 successfully	USINT
5	Current Step	Active program step	UINT
6	Program-Result	0 = No result 1 = Selected program completed successfully 2 = Selected program not completed successfully	USINT

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 ℃	Slope mV/pH	Zero point pH
pH ISFET	Current raw value mV	Current measured value pH	Temperature ℃	Slope mV/pH	Zero point pH
ORP	Current raw value mV	Current measured value pH (Raw value+Offset)	Temperature ℃	Offset value mV	No data
pH/ORP	pH calibration				
	Current raw value mV	Current measured value pH	Temperature ℃	Slope mV/pH	Zero point pH
	ORP calibration				
	Current raw value mV	Current measured value pH (Raw value+Offset)	Temperature ℃	Offset value mV	No data

4.2.3 Calibration parameters

Register	Parameter	Description	Data type
10 - 11	CalibrationResult1-Value		REAL
12	CalibrationResult1-Unit	0 = No unit 7 = % 23 = nA 25 = mA 53 = pH 59 = hPa 65 = kΩ 66 = MΩ 89 = ℃ 90 = K 110 = mV 114 = mV/pH 127 = ℉	USINT
13	CalibrationResult1-Valid	0 = OK 1 = Busy 2 = Local calibration active 3 = Sensor not configured 4 = Sensor not supported 5 = Invalid entry 6 = Calibration error	USINT

Register	Parameter	Description	Data type
14	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	USINT
20-21	CalibrationResult2-Value		REAL
22	CalibrationResult2-Unit	0 = No unit 7 = % 23 = nA 25 = mA 53 = pH 59 = hPa 65 = kΩ 66 = MΩ 89 = ℃ 90 = K 110 = mV 114 = mV/pH 127 = ℉	USINT
23	CalibrationResult2-Valid	0 = OK 1 = Busy 2 = Local calibration active 3 = Sensor not configured 4 = Sensor not supported 5 = Invalid entry 6 = Calibration error	USINT
24	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	USINT
30-31	CalibrationResult3-Value		REAL
32	CalibrationResult3-Unit	0 = No unit 7 = % 23 = nA 25 = mA 53 = pH 59 = hPa 65 = kΩ 66 = MΩ 89 = ℃ 90 = K 110 = mV 114 = mV/pH 127 = ℉	USINT

Register	Parameter	Description	Data type
33	CalibrationResult3-Valid	0 = OK 1 = Busy 2 = Local calibration active 3 = Sensor not configured 4 = Sensor not supported 5 = Invalid entry 6 = Calibration error	USINT
34	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	USINT
40-41	CalibrationResult4-Value		REAL
42	CalibrationResult4-Unit	0 = No unit 7 = % 23 = nA 25 = mA 53 = pH 59 = hPa 65 = kΩ 66 = MΩ 89 = ℃ 90 = K 110 = mV 114 = mV/pH 127 = ℉	USINT
43	CalibrationResult4-Valid	0 = OK 1 = Busy 2 = Local calibration active 3 = Sensor not configured 4 = Sensor not supported 5 = Invalid entry 6 = Calibration error	USINT
44	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	USINT
50-51	CalibrationResult5-Value		REAL

Register	Parameter	Description	Data type
52	CalibrationResult5-Unit	0 = No unit 7 = % 23 = nA 25 = mA 53 = pH 59 = hPa 65 = kΩ 66 = MΩ 89 = ℃ 90 = K 110 = mV 114 = mV/pH 127 = ℉	USINT
53	CalibrationResult5-Valid	0 = OK 1 = Busy 2 = Local calibration active 3 = Sensor not configured 4 = Sensor not supported 5 = Invalid entry 6 = Calibration error	USINT
54	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	USINT

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 MΩ	Temperature ℃	----
pH ISFET	Current measured value pH	Raw value mV	Leak current nA	Temperature ℃	----
ORP	ORP mV	ORP %	----	Temperature ℃	----
pH/ORP	Current measured value pH	ORP mV	Raw value mV	Temperature ℃	Reference impedance kΩ

4.2.5   Information about measuring point 1

Register	Parameter	Description	Data type
100	Channel1-Activation	0 = Active 1 = Not active (only read in at restart)	UINT
101	Channel1-Position	0 = Assembly in service position 1 = Assembly in measure position	UINT

Register	Parameter	Description	Data type
102	Channel1-Hold	0 = Not active 1 = Active	UINT
103	Channel1-ConnectedSensorType	0 = None 3 = pH glass 5 = pH ISFET 8 = ORP 18 = pH/ORP	UINT
110 - 111	Channel1-Value1		REAL
112	Channel1-Value1-Unit	0 = No unit 7 = % 23 = nA 25 = mA 53 = pH 59 = hPa 65 = kΩ 66 = MΩ 89 = ℃ 90 = K 110 = mV 114 = mV/pH 127 = ℉	UINT
113	Channel1-Value1-Valid	0 = Good 1 = Uncertain 2 = Bad 3 = Not assigned	UINT
120 - 121	Channel1-Value2		REAL
122	Channel1-Value2-Unit	0 = No unit 7 = % 23 = nA 25 = mA 53 = pH 59 = hPa 65 = kΩ 66 = MΩ 89 = ℃ 90 = K 110 = mV 114 = mV/pH 127 = ℉	UINT
123	Channel1-Value2-Valid	0 = Good 1 = Uncertain 2 = Bad 3 = Not assigned	UINT
130 - 131	Channel1-Value3		REAL
132	Channel1-Value3-Unit	0 = No unit 7 = % 23 = nA 25 = mA 53 = pH 59 = hPa 65 = kΩ 66 = MΩ 89 = ℃ 90 = K 110 = mV 114 = mV/pH 127 = ℉	UINT
133	Channel1-Value3-Valid	0 = Good 1 = Uncertain 2 = Bad 3 = Not assigned	UINT
140 - 141	Channel1-Value4		REAL

Register	Parameter	Description	Data type
142	Channel1-Value4-Unit	0 = No unit 7 = % 23 = nA 25 = mA 53 = pH 59 = hPa 65 = kΩ 66 = MΩ 89 = ℃ 90 = K 110 = mV 114 = mV/pH 127 = ℉	UINT
143	Channel1-Value4-Valid	0 = Good 1 = Uncertain 2 = Bad 3 = Not assigned	UINT
150 - 151	Channel1-Value5		REAL
152	Channel1-Value5-Unit	0 = No unit 7 = % 23 = nA 25 = mA 53 = pH 59 = hPa 65 = kΩ 66 = MΩ 89 = ℃ 90 = K 110 = mV 114 = mV/pH 127 = ℉	UINT
153	Channel1-Value5-Valid	0 = Good 1 = Uncertain 2 = Bad 3 = Not assigned	UINT

4.2.6   Information about measuring point 2

Register	Parameter	Description	Data type
200	Channel2-Activation	0 = Active 1 = Not active (only read in at restart)	UINT
201	Channel2-Position	0 = Assembly in service position 1 = Assembly in measure position	UINT
202	Channel2-Hold	0 = Not active 1 = Active	UINT
203	Channel2-ConnectedSensorType	0 = None 3 = pH glass 5 = pH ISFET 8 = ORP 18 = pH/ORP	UINT
210 - 211	Channel2-Value1		REAL

Register	Parameter	Description	Data type
212	Channel2-Value1-Unit	0 = No unit 7 = % 23 = nA 25 = mA 53 = pH 59 = hPa 65 = kΩ 66 = MΩ 89 = ℃ 90 = K 110 = mV 114 = mV/pH 127 = ℉	UINT
213	Channel2-Value1-Valid	0 = Good 1 = Uncertain 2 = Bad 3 = Not assigned	UINT
220 - 221	Channel2-Value2		REAL
222	Channel2-Value2-Unit	0 = No unit 7 = % 23 = nA 25 = mA 53 = pH 59 = hPa 65 = kΩ 66 = MΩ 89 = ℃ 90 = K 110 = mV 114 = mV/pH 127 = ℉	UINT
223	Channel2-Value2-Valid	0 = Good 1 = Uncertain 2 = Bad 3 = Not assigned	UINT
230 - 231	Channel2-Value3		REAL
232	Channel2-Value3-Unit	0 = No unit 7 = % 23 = nA 25 = mA 53 = pH 59 = hPa 65 = kΩ 66 = MΩ 89 = ℃ 90 = K 110 = mV 114 = mV/pH 127 = ℉	UINT
233	Channel2-Value3-Valid	0 = Good 1 = Uncertain 2 = Bad 3 = Not assigned	UINT
240 - 241	Channel2-Value4		REAL

Register	Parameter	Description	Data type
242	Channel2-Value4-Unit	0 = No unit 7 = % 23 = nA 25 = mA 53 = pH 59 = hPa 65 = kΩ 66 = MΩ 89 = ℃ 90 = K 110 = mV 114 = mV/pH 127 = ℉	UINT
243	Channel2-Value4-Valid	0 = Good 1 = Uncertain 2 = Bad 3 = Not assigned	UINT
250 - 251	Channel2-Value5		REAL
252	Channel2-Value5-Unit	0 = No unit 7 = % 23 = nA 25 = mA 53 = pH 59 = hPa 65 = kΩ 66 = MΩ 89 = ℃ 90 = K 110 = mV 114 = mV/pH 127 = ℉	UINT
253	Channel2-Value5-Valid	0 = Good 1 = Uncertain 2 = Bad 3 = Not assigned	UINT

4.2.7   IO feedbacks

Register Bytes	Parameter	Description	Data type
900	LED	0 = Off 8 = Green 18 = Red	USINT
901	Current Response	(currently not supported)	USINT
902	Local Softkey	0 = No softkey is pressed 6 = Softkey 1 is pressed 10 = Softkey 2 is pressed 14 = Softkey 3 is pressed 18 = Soft key 4 is pressed	USINT
903	Current Command	(currently not supported)	USINT
904	Canister1	0 = Empty 1 = Full, not empty	BYTE
905	PressureSwitch	0 = Not active 1 = Active	BYTE
906	Canister3	0 = Empty 1 = Full, not empty	BYTE
907	Canister2	0 = Empty 1 = Full, not empty	BYTE
910	Assembly1 Measure	0 = Off 1 = On	BYTE

Register Bytes	Parameter	Description	Data type
911	Assembly1 Service	0 = Off 1 = On	BYTE
912	WaterValve	0 = Off 1 = On	BYTE
913	AirValve	0 = Off 1 = On	BYTE
914	Pump1	0 = Off 1 = On	BYTE
915	Pump2		
916	Pump3		
917	CustomValve1	0 = Off 1 = On	BYTE
918	ChannelSwitch1	0 = Off 1 = On	BYTE
919	ChannelSwitch2		
920	Assembly2 Measure	0 = Off 1 = On	BYTE
921	Assembly2 Service	0 = Off 1 = On	
922	CustomValve2	0 = Off 1 = On	BYTE
923	CustomValve3		
924	CustomValve4		
925	CustomValve5		
930	CustomDo1	0 = Off 1 = On	BYTE
931	CustomDo2		
932	CustomDo3		
933	CustomDo4		
934	CustomDo5		
935	CustomDo6		
936	CustomDo7		
937	CustomDo8		
938	CustomDo9		
939	CustomDo10		
940	CustomDo11		
941	CustomDo12		
942	Assembly1 Position	0 = Service 1 = Measure	BYTE
943	Assembly2 Position		
944	Program active	0 = No program 1 = Program active	BYTE
945	Alarm active	0 = Off 1 = On Flashing between 0 and 1= Other diagnostic message active	BYTE
946 169	Assembly1 Position switch 1 (DI1)	0 = Off 1 = On	BYTE
947	Assembly1 Position switch 2 (DI2)	0 = Off 1 = On	BYTE
948	Assembly2 Position switch 1 (DI3)	0 = Off 1 = On	BYTE

Register Bytes	Parameter	Description	Data type
949	Assembly2 Position switch 2 (DI4)	0 = Off 1 = On	BYTE
950	CustomDI1	0 = Off 1 = On	BYTE
951	CustomDI2		
952	CustomDI3		
953	CustomDI4		
954	CustomDI5		
955	CustomDI6		
956	CustomDI7		
957	CustomDI8		
958	Remote Softkey1 (DI13)	0 = Off 1 = On	BYTE
959	Remote Softkey2 (DI14)		
960	Remote Softkey3 (DI15)		
961	Remote Softkey4 (DI16)		

4.2.8 Name of the device

Parameter	Description	Data type	Register
Device-Tag	Device description/TAG	STRING(32)	60-75

4.2.9 Device information

Parameter	Description	Data type	Bytes
Firmware	Firmware version	STRING(8)	1000 - 1003
ShortOrdercode	Short order code	STRING(16)	1004 - 1011
SerialNumber	Serial number	STRING(16)	1012 - 1019
ManufactoringDate	Date of manufacture	DATETIME	1020 - 1023
OrginalOrdercodeExt	Extended (original) manufacturing order code	STRING(64)	1024 - 1055
CurrentOrdercodeExt	Extended order code from last upgrade	STRING(64)	1056 - 1087

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