Operating Instructions

METROTEC

Systems for Measuring and Controlling Oxygen

METROTEC APP

Configuration Application (Windows) for

Oxygen Measuring Modules

*** Version 1.0 ***

Our management system is certified according to

DIN EN ISO 9001:2015

Table of Contents

1. General

This application for Windows terminals described hereafter enables communication with compatible oxygen measuring modules via a Bluetooth connection. The application enables to see measuring values and change configuration settings. It also enables the adjustment of oxygen measuring modules. The required hardware consists of a Windows terminal and a compatible oxygen measuring module.

Note:
The following visualizations and procedures may vary depending on the WINDOWS version and PC settings.

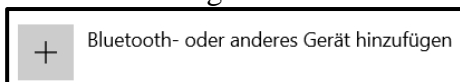## 2. Installation

How to install the application:

1. Download the application from the *Downloads/App* section on the www.metrotec.eu website.
2. After extracting the *.zip* folder, the *Setup.exe* file of the application can be installed.

3. Having been successfully installed, the application can be started via the [Metrotec_PC] icon.
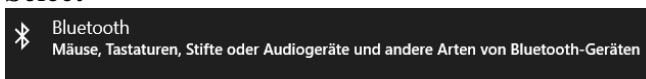
3. Pairing

In order to use the application with an oxygen measuring module, the module must be paired with your Windows terminal. To do so, please proceed as follows:

1. Activate the Bluetooth function of your oxygen measuring module.
   Note: *Find more information in the operating instructions of the module used.*
2. Activate the Bluetooth function of your Windows terminal.
   Note: *(This is device-dependent. Please look up the operating instructions of your Windows terminal).*
3. Start searching for Bluetooth devices on your Windows terminal via

   [+ Bluetooth- oder anderes Gerät hinzufügen]

4. Select

   [Bluetooth — Mäuse, Tastaturen, Stifte oder Audiogeräte und andere Arten von Bluetooth-Geräten]

5. After the search the available oxygen measuring modules are shown.

   Gerät hinzufügen
   Stellen Sie sicher, dass das Gerät eingeschaltet und auffindbar ist. Wählen Sie unten ein Gerät aus, um eine Verbindung herzustellen.

   U16Digital SN 16062401
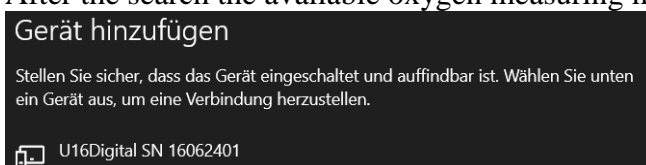
6. Select the desired oxygen measuring oxygen measuring module and pair the module by entering the *Code "1234"*.
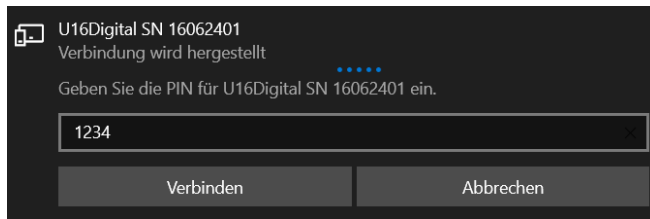
Note:

The described process needs to be carried out only once.
Repeat the process in case additional devices are to be connected.

4. Operation

This section will explain how to establish a connection with an oxygen measuring module and provide an overview over the user interface and the functions of the individual menus.
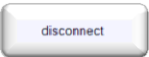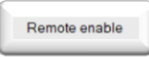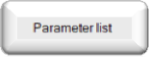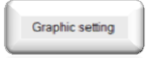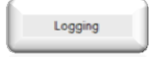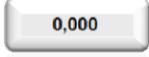
1. Open the application by double-clicking on the icon Metrotec_PC.
2. Stop the log process via the Bluetooth select button.
3. Select the desired oxygen measuring module from the list shown and connect it via the Select and close button.

4. On the main page now displayed, all relevant measurands are shown.
5. The input area is disabled in order to prevent accidental changes to parameters.
6. Enter the release code "5678" via the [Remote enable] button in order to enable the edit mode.
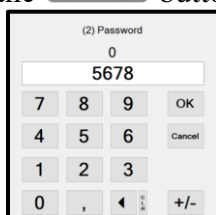
The following table contains and describes the button functions:
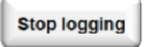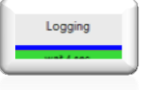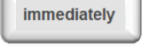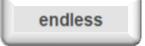
Button	Function
disconnect	Connecting/Disconnecting an oxygen measuring module
Bluetooth select	Select oxygen measuring module
Remote enable	Disable/Enable edit mode by entering the code
Parameter list	Open parameter list
Graphic setting	Graphic display of measured values for oxygen and temperature
Logging	Start/Stop datalogging
0,000	Correction value *Reference Point*
1,000	Correction value *Operating Point*
230.000	Limit value

5. Measured Value Logging

The following dialog may be used to log measured values. It is possible to predefine file name and storage location. Storage interval and start/stop time can also be defined. The log will be saved in CSV format.

The following table contains and describes the button functions:

Button	Function
Start logging	Starting a datalogging process
Stop logging	Stopping a datalogging process
Logging	Display during the datalogging
immediately	Setting a start time
endless	Setting a stop time

Note:
"Start logging" should only be executed in group "0". During the data recording the group must not be changed.

1. Start the measured value recording via the `Logging` button.
2. Adjust the file name and the storage location in the *File Name* section, if necessary
3. Log interval and start/stop time can be adjusted in the Timing section.
4. The recording process can be started via the `Stop logging` button.
5. The recording stops after pressing the `Stop logging` button or after the set time has expired.

6. Graphic Recording

The following dialog serves to configure the graphic display of the measured values.

Input
y-axis lin

Input
y-axis log

Input
y-axis Temp.

Input update
interval

Graphic parameters — □ ×

ppm → log

			Graph update interval (scaling of the x-axis)	Close
Y-Axis max.	250000	0	
Y-Axis min.	0	-10	
Y-Axis Temp. max.	700	
Y-Axis Temp. min.	0	

1 second (10 minutes)
2 second (20 minutes)
3 second (30 minutes)
6 second (1 hour)
12 second (2 hour)
24 secound (4 hour)
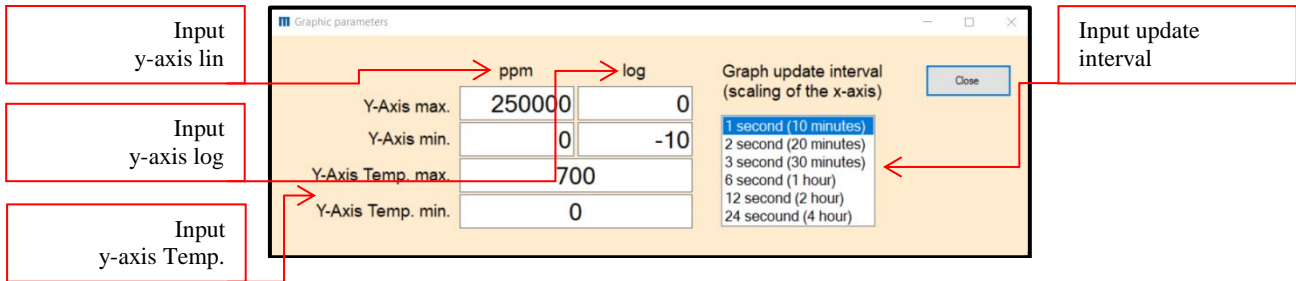
1. Open the settings via the [Graphic setting] button.
2. Adjust the scaling of the x- and y-axes of the Oxygen lin/log and Temperature graphs.

7. Configuration of U16 Module

This section will describe the parameters for adjusting and changing the configuration of a Type U16 oxygen measuring module in the application.

7.1 Parameter List

The [Parameter list] button will take you to the parameter list. The parameter *95 *PG* may be used to switch between different parameter groups.
In order to make changes to the configuration, the edit mode must be enabled as described in *Chapter 4 Operation*.

The following table contains and describes the parameter groups:

Group		Subject of Parameters
0	*PG Custom Main U16	Start Info
1	*PG Custom Adjustment	Adjustment of measured value
2	*PG Custom Setup mA1	Analog output 1
3	*PG Custom Setup mA2	Analog output 2
4	*PG Custom Setup Alarm	Limit value / Alarm
5	*PG Bus Setup U16	Field bus

7.2 Parameter Groups

After switching to the parameter list, the parameter group 0 *Custom Main U16* will be shown by default.

7.2.1 Parameter Group 0

In order to be able to switch to another parameter group as shown in *Chapter 7.1 Parameter List*, the edit mode must be enabled as shown in *Chapter 4 Operation*.
In parameter group 0 switching to parameter groups 1-5 is possible.

Nr.	Par. name	Value
0	O2 Lin ppm5 U16/5	209400,000
95	*PG Custom Main U16	0
1	Temperature	505
2	*Reference Point	0,000
3	*Operating Point	1,000
7	System flags	0000000011110100
9	EMF (mV)	0,038
10	Out1=ppm (4-20mA)	17,400
11	Out2=ppm (4-20mA)	20,000
25	*mA1 ppm (1-4)	2
26	*mA2 ppm (1-4)	2
30	*Display at error	15
56	*Measurem. 1ppm 0log	1
155	O2 log actual	-0,679
156	O2 ppm actual	209400,031
80	Status :1	Sensor ready
47	UMODUL V1.0.BAS	18-09-2024 10:08:17

The following table contains and describes the parameters:

Parameter	Function		
0 O2	Current measured value oxygen		
95 *PG	Selection of parameter group (0....5)		
1 Temperature	Current measured value sensor temperature		
2 *Reference Point	Correction value for air flushing		
3 *Operating Point	Test gas correction value		
7 System flags	Message list information		
9 EMF (mV)	Display of Sensor signal in mV		
10 Out 1	Reading of output value in mA		
11 Out 2	Reading of output value in mA		
25 *mA1	Output type Out1 (1=log;2=ppm;3=EMF;4=Temp)		
26 *mA2	Output type Out2 (1=log;2=ppm;3=EMF;4=Temp)		
30 *Display at error	Application display: (Standard=15)		
56 *Measurem. 1ppm 0log	Switch alarm evaluation and oxygen reading in application (0=logarithmic;1=ppm)		
155 O2 log actual	Current measured value oxygen log		
156 O2 ppm actual	Current measured value oxygen lin		
80 Status	Reading of module status		
	Sensor ready	Measurement active, no errors	
	Preheat xxx sec.	Measurement in heating-up phase	
	Line break	Sensor cable broken	
	Short circuit	Sensor cable short circuit	
	Under temperature	Sensor temperature too low	
47 UMODUL	Software version		

Note:

The parameter group 0 should only be used for selecting parameter groups 1-5. Further settings may be done in the respective parameter groups.

7.2.2 Parameter Group 1

Entering 1 in Parameter *95 *PG* will take you to parameter group *Custom Adjustment.* In order to make changes to the configuration, the edit mode must be enabled as described in *Chapter 4 Operation*.
Parameter group 1 will allow you to adjust the oxygen measurement.

Nr.	Par. name	Value
0	O2 Lin ppm5 U16/5	185912,000
95	*PG CustomAdjustment	1
1	Temperature	505
2	*Reference Point	2,000
3	*Operating Point	1,000
7	System flags	0000000011110100
9	EMF (mV)	2,004
10	Out1=ppm (4-20mA)	15,900
11	Out2=ppm (4-20mA)	20,000
155	O2 log actual	-0,731
156	O2 ppm actual	185927,125

The following table contains and describes the parameters:

Parameter	Function
0 O2	Current measured value oxygen
95 *PG	Selection of parameter group (0….5)
1 Temperature	Current measured value sensor temperature
2 *Reference Point	Correction value for air flushing
3 *Operating Point	Test gas correction value
7 System flags	Message list information
9 EMF (mV)	Display of Sensor signal in mV
10 Out1	Reading of output value in mA
11 Out2	Reading of output value in mA
155 O2 log actual	Current measured value oxygen log
156 O2 ppm actual	Current measured value oxygen lin

Note:
There is a reference point and an operating point. The reference point refers to an air level of 20.94% oxygen. The operating point refers to a measured value which is smaller or larger than the reference point (test gas). The order of adjusting must start with the reference point. The adjustment of a operating point with the reference point leads to a shifting measurement curve and to deviating measurements at various oxygen concentration levels.

This section describes how to execute the adjustment of the oxygen measurement by means of oxygen sensor and oxygen measuring module.

1. Start the oxygen measurement process according to the operating instructions of the module used (up-to-date operating instructions may be obtained in the *Downloads/Manuals* section on the www.metrotec.eu website).
2. The oxygen measurement should be operational around 30 minutes before the adjustment will be executed.
3. Connect the oxygen measuring module as described in *Chapter 4 Operation*.

Correction of Reference Points:

1. Make sure that the sensor is flushed through with clean ambient air.
2. Adjust parameter *2 *Reference Point* until the sensor signal in mV at parameter *9 EMF (mV)* reads 0mV.
3. In case an adjustment with a test gas is not required, the adjustment is now complete.

Correction of Operating Point

1. Flush through the sensor with a test gas of which the oxygen level is known.
2. Wait until the displayed current measured value of oxygen parameter *0 O2* does not change anymore.
3. Adjust parameter *3 *Operating Point* until the current measured value of oxygen at parameter *0 O2* corresponds with the value of the test gas.
4. The adjustment is complete and the test may be removed.

7.2.3 Parameter Group 2

Entering 2 in Parameter *95 *PG* will take you to parameter group *Custom Setup mA1*. In order to make changes to the configuration, the edit mode must be enabled as described in *Chapter 4 Operation*.
Parameter group 2 will allow you to configure the analog output 1.

Nr.	Par. name	Value
0	O2 Lin ppm5 U16/5	209400,000
95	*PG Custom Setup mA1	2
1	Temperature	505
7	System flags	0000000011110100
9	EMF (mV)	0,032
10	Out1=ppm (4-20mA)	17,400
25	*mA1 ppm (1-4)	2
155	O2 log actual	-0,679
156	O2 ppm actual	209400,031
171	*EMF 3=4-20mA 1/2/3	3
172	*EMF min. mA	0,000
173	*EMF max. mA	2000,000
174	*mA NotReady EMF	4,000
175	*ppm 3=4-20mA 1/2/3	3
176	*ppm min. mA	0
177	*ppm max. mA	250000
178	*mA NotReady ppm	20,000
179	*log 3=4-20mA 1/2/3	3
180	*log min. mA	-0,602
181	*log max. mA	0,000
182	*mA NotReady log	20,000
192	*Sim mA ^-2 0-24	-1,000

The following table contains and describes the parameters:

Parameter	Function
0 O2	Current measured value oxygen
95 *PG	Selection of parameter group (0….5)
1 Temperature	Current measured value sensor temperature
7 System flags	Message list information
9 EMF (mV)	Display of Sensor signal in mV
10 Out1	Reading of output value in mA
25 *mA1	Output type Out1 (1=log;2=ppm;3=EMF;4=Temp)
155 O2 log actual	Current measured value oxygen log
156 O2 ppm actual	Current measured value oxygen lin
171 *EMF	mA type Out1 (1=0-24mA; 2=0-20mA; 3=4-20mA)
172 *EMF min. mA	Scaling Out1 Minimum for EMF
173 *EMF max. mA	Scaling Out1 Maximum for EMF
174 *mA NotReady EMF	mA reading at NotReady for EMF
175 *ppm	mA type Out1 (1=0-24mA; 2=0-20mA; 3=4-20mA)
176 *ppm min. mA	Scaling Out1 Minimum for ppm
177 *ppm max. mA	Scaling Out1 Maximum for ppm
178 *mA NotReady ppm	mA reading at NotReady for ppm
179 *log	mA type Out1 (1=0-24mA; 2=0-20mA; 3=4-20mA)
180 *log min. mA	Scaling Out1 Minimum for log
181 *log max. mA	Scaling Out1 Maximum for log

182 *mA NotReady log	mA reading at NotReady for log
192 *Sim mA -2 0-24	Simulation Out1

7.2.4 Parameter Group 3

Entering 3 in Parameter *95 *PG* will take you to parameter group *Custom Setup mA2*. In order to make changes to the configuration, the edit mode must be enabled as described in *Chapter 4 Operation*.
Parameter group 3 will allow you to configure the analog output 2.

Nr.	Par. name	Value
0	O2 Lin ppm5 U16/5	209400,000
95	*PG Custom Setup mA2	3
1	Temperature	505
7	System flags	0000000011110100
9	EMF (mV)	0,042
11	Out2=ppm (4-20mA)	20,000
26	*mA2 ppm (1-4)	2
155	O2 log actual	-0,679
156	O2 ppm actual	209400,031
221	*EMF 3=4-20mA 1/2/3	3
222	*EMF min. mA	0,000
223	*EMF max. mA	2000,000
224	*mA NotReady EMF	4,000
225	*ppm 3=4-20mA 1/2/3	3
226	*ppm min. mA	0
227	*ppm max. mA	1000
228	*mA NotReady ppm	20,000
229	*log 3=4-20mA 1/2/3	3
230	*log min. mA	-3,000
231	*log max. mA	0,000
232	*mA NotReady log	20,000
242	*Sim mA ^-2 0-24	-1,000

The following table contains and describes the parameters:

Parameter	Function
0 O2	Current measured value oxygen
95 *PG	Selection of parameter group (0….5)
1 Temperature	Current measured value sensor temperature
7 System flags	Message list information
9 EMF (mV)	Display of Sensor signal in mV
11 Out2	Reading of output value in mA
26 *mA2	Output type Out1 (1=log;2=ppm;3=EMF;4=Temp)
155 O2 log actual	Current measured value oxygen log
156 O2 ppm actual	Current measured value oxygen lin
221 *EMF	mA type Out2 (1=0-24mA; 2=0-20mA; 3=4-20mA)
222 *EMF min. mA	Scaling Out2 Minimum for EMF
223 *EMF max. mA	Scaling Out2 Maximum for EMF
224 *mA NotReady EMF	mA reading at NotReady for EMF
225 *ppm	mA type Out2 (1=0-24mA; 2=0-20mA; 3=4-20mA)
226 *ppm min. mA	Scaling Out2 Minimum for ppm
227 *ppm max. mA	Scaling Out2 Maximum for ppm

228 *mA NotReady ppm	mA reading at NotReady for ppm
229 *log	mA type Out2 (1=0-24mA; 2=0-20mA; 3=4-20mA)
230 *log min. mA	Scaling Out2 Minimum for log
231 *log max. mA	Scaling Out2 Maximum for log
232 *mA NotReady log	mA reading at NotReady for log
242 *Sim mA -2 0-24	Simulation Out2

7.2.5 Parameter Group 4

Entering 4 in Parameter *95 *PG* will take you to parameter group *Custom Setup Alarm.* In order to make changes to the configuration, the edit mode must be enabled as described in *Chapter 4 Operation*.
Parameter group 4 will allow you to configure the digital limit value contact.

Nr.	Par. name	Value
0	O2 Lin ppm5 U16/5	209400,000
95	*PG CustomSetupAlarm	4
1	Temperature	505
7	System flags	0000000011110100
9	EMF (mV)	0,057
155	O2 log actual	-0,679
156	O2 ppm actual	209400,031
260	*Limit Value Lin	250000
261	*Hyst.Lim Relay Lin	0
262	*Limit Value Log	-0,668
263	*Hyst.Lim Relay Log	0,000
270	*Sim Ready Rel. <>-1	-1
271	*Sim Alarm Rel. <>-1	-1

The following table contains and describes the parameters:

Parameter	Function
0 O2	Current measured value oxygen
95 *PG	Selection of parameter group (0….5)
1 Temperature	Current measured value sensor temperature
7 System flags	Message list information
9 EMF (mV)	Display of Sensor signal in mV
155 O2 log actual	Current measured value oxygen log
156 O2 ppm actual	Current measured value oxygen lin
260 *Limit Value Lin	Limit value for ppm
261 *Hyst.Lim Relay Lin	Switching hysteresis limit value for ppm
262 *Limit Value Log	Limit value for log
263 *Hyst.Lim Relay Log	Switching hysteresis limit value for log
270 *Sim Ready Rel. < >-1	Simulation Relay Ready
271 *Sim Alarm Rel. < >-1	Simulation Relay Alarm

Note:
The adjustment of parameter *56 *Measurem. 1ppm 0log* in parameter group 0 *Custom Main U16* defines the active limit value as either lin or log (see *Chapter 7.2.1 Parameter Group 0*).

7.2.6   Parameter Group 5

Entering 5 in Parameter *95 *PG* will take you to parameter group *Custom Field Bus.* In order to make changes to the configuration, the edit mode must be enabled as described in *Chapter 4 Operation.*

Parameter group 5 will allow you to configure the bus, if available.

Note:

The bus type is device-dependent and is defined with the module order

The following table contains and describes the parameters:

Bus type
Modbus
Powerlink
Profinet
EtherCAT

7.2.6.1   Modbus

Nr.	Par. name	Value
0	O2 Lin ppm5 U16/5	0,000
95	*PG Custom Bus Param	5
67	U16 Bus Sign Of Life	148
68	*Bus write enabled=1	1
69	Comand No. UModul	0
70	Comand No. PLC	0
71	Parameter No. PLC	0
72	Value PLC	0,000
74	Sign Of Life PLC	0
78	*Modbus Testvalue	0
499	====================	====================
360	*Modbus IP xxx.-.-.-	192
361	*Modbus IP -.xxx.-.-	168
362	*Modbus IP -.-.xxx.-	0
363	*Modbus IP -.-.-.xxx	80
364	*Modb.Mask xxx.-.-.-	255
365	*Modb.Mask -.xxx.-.-	255
366	*Modb.Mask -.-.xxx.-	255
367	*Modb.Mask -.-.-.xxx	0
368	*Write values = 7878	0

The following table contains and describes the parameters:

Parameter	Function
0 O2	Current measured value oxygen level
95 *PG	Selection of parameter group (0….5)
67 U16 Bus Sign Of Life	Bus module OK when counter runs
68 *Bus write enabled=1	At 1, writing via bus enabled
69 Comand No. UModul	Command counter module
70 Comand No. PLC	Command counter PLC
71 Parameter No. PLC	Sent parameter number from PLC
72 Value PLC	Sent parameter value from PLC

74 Sign Of Life PLC	Bus PLC OK when counter runs
78 *Modbus Testvalue	At 1, sending fixed values to test the bus
360 *Modbus IP xxx.-.-.-	Ethernet IP address block 1
361 *Modbus IP -.xxx.-.-	Ethernet IP address block 2
362 *Modbus IP -.-.xxx.-	Ethernet IP address block 3
363 *Modbus IP -.-.-.xxx	Ethernet IP address block 4
364 *Modb.Mask xxx.-.-.-	Subnet mask block 1
365 *Modb.Mask -.xxx.-.-	Subnet mask block 2
366 *Modb.Mask -.-.xxx.-	Subnet mask block 3
367 *Modb.Mask -.-.-.xxx	Subnet mask block 4
368 *Write values = 7878	Enter 7878 to accept the IP address and subnet mask

7.2.6.2 Powerlink

The following table contains and describes the parameters:

Parameter	Function
0 O2	Current measured value oxygen level
95 *PG	Selection of parameter group (0….5)
67 U16 Bus Sign Of Life	Bus module OK when counter runs
68 *Bus write enabled=1	At 1, writing via bus enabled
69 Comand No. UModul	Command counter module
70 Comand No. PLC	Command counter PLC
71 Parameter No. PLC	Sent parameter number from PLC
72 Value PLC	Sent parameter value from PLC
74 Sign Of Life PLC	Bus PLC OK when counter runs
78 *Powerlink Testvalue	At 1, sending fixed values to test the bus
376 DNS-Nodename	Node name
377 *DNS-Node ID	Node address
378 *Gateway1 xxx.-.-.-	Gateway IP address block 1
379 *Gateway2 -.xxx.-.-	Gateway IP address block 2
380 *Gateway3 -.-.xxx.-	Gateway IP address block 3
381 *Gateway4 -.-.-.xxx	Gateway IP address block 4

7.2.6.3   Profinet

The following table contains and describes the parameters:

Parameter	Function
0 O2	Current measured value oxygen level
95 *PG	Selection of parameter group (0….5)
67 U16 Bus Sign Of Life	Bus module OK when counter runs
68 *Bus write enabled=1	At 1, writing via bus enabled
69 Comand No. UModul	Command counter module
70 Comand No. PLC	Command counter PLC
71 Parameter No. PLC	Sent parameter number from PLC
72 Value PLC	Sent parameter value from PLC
74 Sign Of Life PLC	Bus PLC OK when counter runs
78 *ProfiNet Testvalue	At 1, sending fixed values to test the bus
345 Default Device Name	Current module name
346 *Set Device Name=273	Enter 273 to accept the module name

7.2.6.4   EtherCAT

The following table contains and describes the parameters:

Parameter	Function
0 O2	Current measured value oxygen level

95 *PG	Selection of parameter group (0….5)
67 U16 Bus Sign Of Life	Bus module OK when counter runs
68 *Bus write enabled=1	At 1, writing via bus enabled
69 Comand No. UModul	Command counter module
70 Comand No. PLC	Command counter PLC
71 Parameter No. PLC	Sent parameter number from PLC
72 Value PLC	Sent parameter value from PLC
74 Sign Of Life PLC	Bus PLC OK when counter runs
78 *EtherCat Testvalue	At 1, sending fixed values to test the bus
351 SPS Flags D15..0	Status bits 1
351 SPS Flags D31..16	Status bits 2

8. Configuration of U15 Module

This section will describe the parameters for adjusting and changing the configuration of a Type U15 oxygen measuring module in the application.

8.1 Parameter List

The ⬚ Parameter list ⬚ button will take you to the parameter list. The parameter *95 *PG* may be used to switch between different parameter groups.
In order to make changes to the configuration, the edit mode must be enabled as described in *Chapter 4 Operation*.

The following table contains and describes the parameter groups:

Group		Subject of Parameters
0	*PG Custom Main U15	Start Info
1	*PG Bus Setup U15	Field bus

8.2 Parameter Groups

After switching to the parameter list, the parameter group 0 *Custom Main U15* will be shown by default.

8.2.1 Parameter Group 0

In order to be able to switch to another parameter group as shown in *Chapter 8.1 Parameter List*, the edit mode must be enabled as shown in *Chapter 4 Operation*.
In parameter group 0 switching to parameter group 1 is possible.

Nr.	Par. name	Value
0	O2 Lin ppm1 U15/1	209400,000
95	*PG Custom Main U15	0
1	Temperature	505
2	*Reference Point	0,000
3	*Operating Point	1,000
4	*Output1 Min Lin	0
5	*Output1 Max Lin	250000
6	*Limit Value Lin	250000
7	System flags	0000000011110100
8	*EMF Output Flag	0
9	EMF (mV)	1,135
10	Out1=ppm (4-20mA)	17,400
11	Out2=ppm (4-20mA)	20,000
12	*Output2 Min Lin	0
13	*Output2 Max Lin	1000
14	*Hyst.Lim Relay Lin	0
25	-mA1 ppm (1-4)	2
30	*Display at error	15
31	*Out1 3=4-20mA 1/2/3	3
32	*Out2 3=4-20mA 1/2/3	3
56	*Measurem. 1ppm 0log	1
64	*Cable length (m)	1
66	EtherCAT= 4	4
80	Status :1	Sensor ready
47	UMODUL V1.0.BAS	22-10-2024 08:35:28
81	Button T1 Prog. mode	0=Prog.mode disabled

The following table contains and describes the parameters:

Parameter	Function		
0 O2 (Lin/Log*)	Current measured value oxygen level		
95 *PG Custom Main U15	Selection of parameter group (0 and 5)		
1 Temperature	Current measured value sensor temperature		
2 *Reference Point	Correction value for air flushing		
3 *Operating Point	Test gas correction value		
4 *Output 1 Min (Lin/Log*)	Oxygen value for analog output 1 at 0/4 mA**		
5 *Output 1 Max (Lin/Log*)	Oxygen value for analog output 1 at 20 mA**		
6 *Limit Value (Lin/Log*)	Limit value for alarm		
7 System flags	Message list information		
8 *EMF Output Flag	Switch outputs to sensor signal in mV		
9 EMF (mV)	Display of Sensor signal in mV		
10 Out 1=(ppm/log* 0/4-20mA**)	Reading of output value in mA		
11 Out 2=(ppm/log* 0/4-20mA**)	Reading of output value in mA		
12 *Output 2 Min (Lin/Log*)	Oxygen value for analog output 2*** at 0/4 mA**		
13 *Output 2 Max (Lin/Log*)	Oxygen value for analog output 2*** at 20 mA**		
14 *Hyst.LimRelais (Lin/Log*)	Hysteresis for alarm relay		
30 *Display at error	Application display: (Standard=15)		
31 *Out1 =(0/4-20mA**) 1/2/3	Output type of analog output 1 (1=0-24;2=0-20;3=4-20)		
32 *Out2 =(0/4-20mA**)*** 1/2/3	Output type of analog output 2*** (1=0-24;2=0-20;3=4-20)		
56 *Measurem. 1ppm 0log	Switch 0=logarithmic;1=linear (ppm)		
64 *Cable length (m)	Cable length between sensor and oxygen measuring module		
66	Bus type if available		
80 Status	Reading of module status		
	Sensor ready	Measurement active, no errors	
	Preheat xxx sec.	Measurement in heating-up phase	
	Line break	Sensor cable broken	
	Short circuit	Sensor cable short circuit	
	Under temperature	Sensor temperature too low	
47 UMODUL	Software version		

*The unit ppm O2 or log O2 depends on type/configuration of oxygen measuring module
*The output in 0-20mA or 4-20mA depends on type/configuration of oxygen measuring module
*** The presence of a second analog output depends on the type of oxygen measuring module

8.2.2 Parameter Group 1

Entering 1 in Parameter *95 *PG* will take you to parameter group *Bus Setup U15*. In order to make changes to the configuration, the edit mode must be enabled as described in *Chapter 4 Operation*.

Parameter group 1 will allow you to configure the bus, if available.

Note:

The bus type is device-dependent and is defined with the module order

The following table contains and describes the parameters:

Bus type
Modbus
Powerlink
Profinet
EtherCAT

8.2.2.1 Modbus

Nr.	Par. name	Value
0	O2 Lin ppm1 U15/1	0,000
95	*PG Bus Setup U15	1
77	Modbus Sign Of Life	151
78	*Send Testvalue=1	0
499	=================	=================
360	*Modbus IP xxx.-.-.-	192
361	*Modbus IP -.xxx.-.-	168
362	*Modbus IP -.-.xxx.-	0
363	*Modbus IP -.-.-.xxx	80
364	*Modb.Mask xxx.-.-.-	255
365	*Modb.Mask -.xxx.-.-	255
366	*Modb.Mask -.-.xxx.-	255
367	*Modb.Mask -.-.-.xxx	0
368	*Write values = 7878	0

The following table contains and describes the parameters:

Parameter	Function
0 O2	Current measured value oxygen level
95 *PG	Selection of parameter group (0 and 1)
77 Modbus Sign Of Life	Bus module OK when counter runs
78 *Send Testvalue=1	At 1, sending fixed values to test the bus
360 *Modbus IP xxx.-.-.-	Ethernet IP address block 1
361 *Modbus IP -.xxx.-.-	Ethernet IP address block 2
362 *Modbus IP -.-.xxx.-	Ethernet IP address block 3
363 *Modbus IP -.-.-.xxx	Ethernet IP address block 4
364 *Modb.Mask xxx.-.-.-	Subnet mask block 1
365 *Modb.Mask -.xxx.-.-	Subnet mask block 2
366 *Modb.Mask -.-.xxx.-	Subnet mask block 3
367 *Modb.Mask -.-.-.xxx	Subnet mask block 4
368 *Write values = 7878	Enter 7878 to accept the IP address and subnet mask

8.2.2.2 Powerlink

The following table contains and describes the parameters:

Parameter	Function
0 O2	Current measured value oxygen level
95 *PG	Selection of parameter group (0 and 1)
67 Powerlink SignOfLife	Bus module OK when counter runs
78 *Send Testvalue=1	At 1, sending fixed values to test the bus
376 DNS-Nodename	Node name
377 *DNS-Nod ID	Node address
378 *Gateway1 xxx.-.-.-	Gateway IP address block 1
379 *Gateway2 -.xxx.-.-	Gateway IP address block 2
380 *Gateway3 -.-.xxx.-	Gateway IP address block 3
381 *Gateway4 -.-.-.xxx	Gateway IP address block 4

8.2.2.3 Profinet

The following table contains and describes the parameters:

Parameter	Function
0 O2	Current measured value oxygen level
95 *PG	Selection of parameter group (0 and 1)
67 SignOfLife Rec.Nr.	Bus module OK when counter runs
78 *Send Testvalue=1	At 1, sending fixed values to test the bus
341 Default Device Name	Current module name
342 *Set Device Name=273	Enter 273 to accept the module name

8.2.2.4 EtherCAT

Nr.	Par. name	Value
0	O2 Lin ppm1 U15/1	0,000
95	*PG Bus Setup U15	1
67	EtherCat_SignOfLife	73
78	*Send Tesvalue=1	0

The following table contains and describes the parameters:

Parameter	Function
0 O2	Current measured value oxygen level
95 *PG	Selection of parameter group (0 and 1)
67 EtherCat_SignOfLife	Bus module OK when counter runs
78 *Send Testvalue=1	At 1, sending fixed values to test the bus

9. Configuration of Z19 Module

This section will describe the parameters for adjusting and changing the configuration of a Type Z19 oxygen measuring module in the application.

9.1   Parameter List

The [Parameter list] button will take you to the parameter list.
In order to make changes to the configuration, the edit mode must be enabled as described in *Chapter 4 Operation*.

Nr.	Par. name	Value
0	O2 Lin ppm	0,000
1	Temperature	0,000
2	*Reference Point	4,360
3	*Operating Point	0,990
4	*Output1 Min Lin	0,000
5	*Output1 Max Lin	5000,000
6	*Limit Value Lin	0,000
7	System flags	0000000001001110
8	*EMF Output Flag	0,000
9	EMF (mV)	201,480
10	Output1 (4-20mA)	20,000
11	Output2 (4-20mA)	20,000
12	*Output2 Min Lin	0,000
13	*Output2 Max Lin	1000,000
14	*Hyst.Lim Relay Lin	0,000
30	*Display at error	0
53	*BeiAlarm4_20auf0	0,000
64	*Cable length (m)	1
80	Status :2	Line break
84	*mA Output (1 =4-20)	1
93	ADC_0 AnzMessungen	105,000

The following table contains and describes the parameters:

Parameter	Function
0 O2 (Lin/Log[*])	Current measured value oxygen level
1 Temperature	Current measured value sensor temperature
2 *Reference Point	Correction value for air flushing
3 *Operating Point	Test gas correction value
4 *Output 1 Min (Lin/Log[*])	Oxygen value for analog output measuring range 1 at 0/4 mA[**]
5 *Output 1 Max (Lin/Log[*])	Oxygen value for analog output of measuring range 1 at 20 mA[**]
6 *Limit Value (Lin/Log[*])	Limit value for alarm
7 System flags	Message list information
8 *EMF Output Flag	Switch output to sensor signal in mV
9 EMF (mV)	Display of Sensor signal in mV
10 Output1 (0/4-20mA[**])	Reading of output value measuring range 1 in mA
11 Output2 (0/4-20mA[**])	Reading of output value measuring range 2 in mA
12 *Output 2 Min (Lin/Log[*])	Oxygen value for analog output measuring range 2 at 0/4 mA[**]
13 *Output 2 Max (Lin/Log[*])	Oxygen value for analog output measuring range 2 at 20

	mA**
14 *Hyst.LimRelais (Lin/Log*)	Hysteresis for alarm relay
30 *Display at error	Application display
53 *On Alarm4_20to0	If analog output not ready to 0mA
64 *Cable length (m)	Cable length between sensor and oxygen measuring module
80 Status	Reading of module status
	Sensor ready	Measurement active, no errors
	Preheat xxx sec.	Measurement in heating-up phase
	Line break	Sensor cable broken
	Short circuit	Sensor cable short circuit
	Under temperature	Sensor temperature too low
84 *mA Output (1=0/4-20mA**)	Output type of analog output 1 (0=0-20;1=4-20)

*The unit ppm O2 or log O2 depends on type/configuration of oxygen measuring module
*The output in 0-20mA or 4-20mA depends on type/configuration of oxygen measuring module

10.   Adjustment

10.1 U16 Module

This section describes how to execute the adjustment of the oxygen measurement by means of oxygen sensor and oxygen measuring module. In order to make changes to the adjustment, switch to parameter group 1 *Custom Adjustment* as described in *Chapter 7.2.2 Parameter Group 1*.

Note:
There is a reference point and an operating point. The reference point refers to an air level of 20.94% oxygen. The operating point refers to a measured value which is smaller or larger than the reference point (test gas). The order of adjusting must start with the reference point. The adjustment of a operating point with the reference point leads to a shifting measurement curve and to deviating measurements at various oxygen concentration levels.

1. Start the oxygen measurement process according to the operating instructions of the module used (up-to-date operating instructions may be obtained in the *Downloads/Manuals* section on the www.metrotec.eu website).
2. The oxygen measurement should be operational around 30 minutes before the adjustment will be executed.
3. Connect the oxygen measuring module as described in *Chapter 4 Operation*.

Correction of Reference Points:

1. Make sure that the sensor is flushed through with clean ambient air.
2. Adjust parameter *2 *Reference Point* until the sensor signal in mV at parameter *9 EMF (mV)* reads 0mV.
3. In case an adjustment with a test gas is not required, the adjustment is now complete.

Correction of Operating Point

1. Flush through the sensor with a test gas of which the oxygen level is known.
2. Wait until the displayed current measured value of oxygen parameter *0 O2* does not change anymore.
3. Adjust parameter *3 *Operating Point* until the current measured value of oxygen at parameter *0 O2* corresponds with the value of the test gas.
4. The adjustment is complete and the test may be removed.

10.2 U15 Module

This section describes how to execute the adjustment of the oxygen measurement by means of oxygen sensor and oxygen measuring module. In order to make changes to the adjustment, switch to parameter group 0 *Custom Main U15* as described in *Chapter 8.2.1 Parameter Group 0*.

Note:
There is a reference point and an operating point. The reference point refers to an air level of 20.94% oxygen. The operating point refers to a measured value which is smaller or larger than the reference point (test gas). The order of adjusting must start with the reference point. The adjustment of a operating point with the reference point leads to a shifting measurement curve and to deviating measurements at various oxygen concentration levels.

1. Start the oxygen measurement process according to the operating instructions of the module used (up-to-date operating instructions may be obtained in the *Downloads/Manuals* section on the www.metrotec.eu website).
2. The oxygen measurement should be operational around 30 minutes before the adjustment will be executed.
3. Connect the oxygen measuring module as described in *Chapter 4 Operation*.

Correction of Reference Points:

1. Make sure that the sensor is flushed through with clean ambient air.
2. Adjust parameter *2 *Reference Point* until the sensor signal in mV at parameter *9 EMF (mV)* reads 0mV.
3. In case an adjustment with a test gas is not required, the adjustment is now complete.

Correction of Operating Point

1. Flush through the sensor with a test gas of which the oxygen level is known.
2. Wait until the displayed current measured value of oxygen parameter *0 O2* does not change anymore.
3. Adjust parameter *3 *Operating Point* until the current measured value of oxygen at parameter *0 O2* corresponds with the value of the test gas.
4. The adjustment is complete and the test may be removed.

10.3 Z19 Module

This section describes how to execute the adjustment of the oxygen measurement by means of oxygen sensor and oxygen measuring module. In order to make changes to the adjustment, switch to the Parameter List as described in Chapter 9.1 Parameter List.

Note:
There is a reference point and an operating point. The reference point refers to an air level of 20.94% oxygen. The operating point refers to a measured value which is smaller or larger than the reference point (test gas). The order of adjusting must start with the reference point. The adjustment of a operating point with the reference point leads to a shifting measurement curve and to deviating measurements at various oxygen concentration levels.

1. Start the oxygen measurement process according to the operating instructions of the module used (up-to-date operating instructions may be obtained in the *Downloads/Manuals* section on the www.metrotec.eu website).
2. The oxygen measurement should be operational around 30 minutes before the adjustment will be executed.
3. Connect the oxygen measuring module as described in *Chapter 4 Operation*.

Correction of Reference Points:

1. Make sure that the sensor is flushed through with clean ambient air.
2. Adjust parameter *2 *Reference Point* until the sensor signal in mV at parameter *9 EMF (mV)* reads 0mV.
3. In case an adjustment with a test gas is not required, the adjustment is now complete.

Correction of Operating Point

1. Flush through the sensor with a test gas of which the oxygen level is known.
2. Wait until the displayed current measured value of oxygen parameter *0 O2* does not change anymore.
3. Adjust parameter *3 *Operating Point* until the current measured value of oxygen at parameter *0 O2* corresponds with the value of the test gas.
4. The adjustment is complete and the test may be removed.