



PolyGard® DGC6

Digital Gas Controller Series

Modbus Supplement

May 2017 / Germany

Software Controller from version 1.00.06 on

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Serial Modbus Interface at the X BUS

This functionality is available from display version 1.00.06 on.

The standard protocol for an additional serial port of the gas controller X bus is ModBus RTU.

Definition of communication

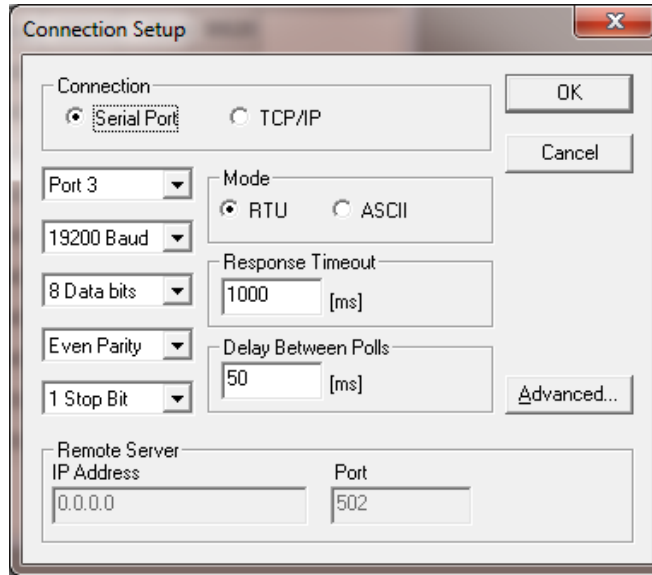
The gas controller operates at the interface X bus only

as **MODBUS slave**.

Baud rate 19,200 baud

1 start bit, 8 data bits

1 stop bit, even parity

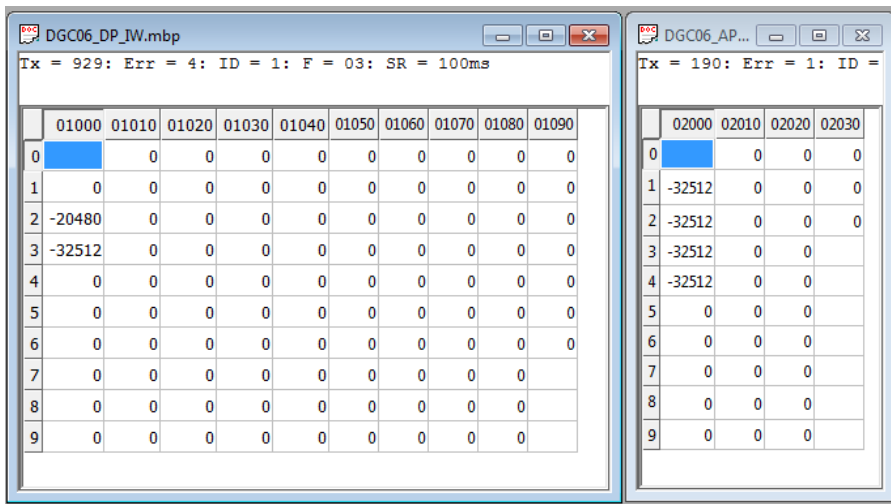


1 Modbus Function 03

Read Holding Registers (reading of holding registers) are used to receive data from the DGC6 system. There are 9 data blocks:

1.1 Current value of digital sensors – sensor addresses 1 to 96, MODBUS addr. 1001 to 1096

1.2 Current value of analog sensors - sensor addresses 1 to 32, MODBUS addr. 2001 to 2032



	01000	01010	01020	01030	01040	01050	01060	01070	01080	01090
0	0	0	0	0	0	0	0	0	0	0
1	0	0	0	0	0	0	0	0	0	0
2	-20480	0	0	0	0	0	0	0	0	0
3	-32512	0	0	0	0	0	0	0	0	0
4	0	0	0	0	0	0	0	0	0	0
5	0	0	0	0	0	0	0	0	0	0
6	0	0	0	0	0	0	0	0	0	0
7	0	0	0	0	0	0	0	0	0	0
8	0	0	0	0	0	0	0	0	0	0
9	0	0	0	0	0	0	0	0	0	0

	02000	02010	02020	02030
0	0	0	0	0
1	-32512	0	0	0
2	-32512	0	0	0
3	-32512	0	0	0
4	-32512	0	0	0
5	0	0	0	0
6	0	0	0	0
7	0	0	0	0
8	0	0	0	0
9	0	0	0	0

Representation of measured values:

The measured values are shown in the Integer format with a factor of 1, 10, 100 or 1000.

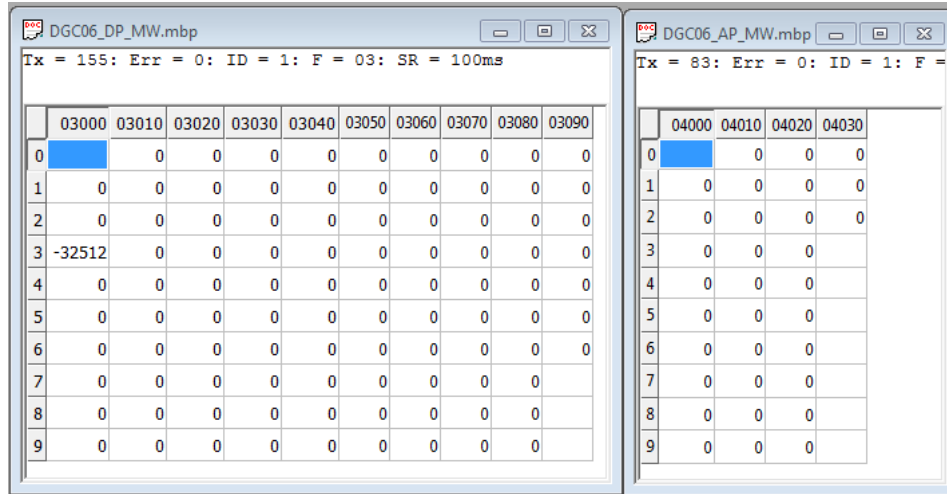
The factor depends on the respective measuring range and is used as follows:

Range	Factor
1 -9	1000
10-99	100
100-999	10
From 1000 on	1

If the value is below -16385, it is an error message and should be considered as a hexadecimal value in order to break the errors down.

1.3 Average value of digital sensors – sensor addr. 1 to 96, MODBUS addr. 3001 to 3096

1.4 Average value of analog sensors- sensor addr. 1 to 32, MODBUS addr. 4001 to 4032



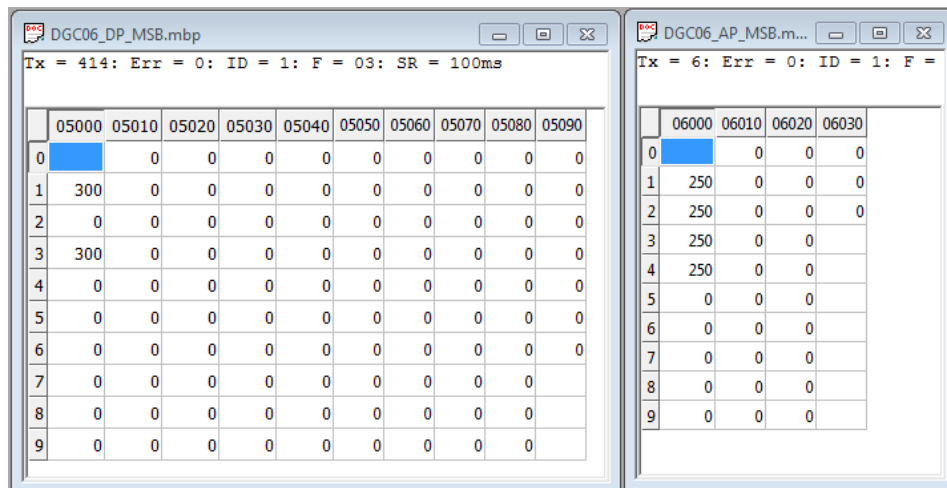
The screenshot shows two software windows. The left window, titled 'DGC06_DP_MW.mbp', displays a table of digital sensor data for addresses 03000 to 03090. The right window, titled 'DGC06_AP_MW.mbp', displays a table of analog sensor data for addresses 04000 to 04030. Both windows show a status bar at the top with 'Tx =', 'Err = 0:', 'ID = 1:', 'F =', and 'SR = 100ms'.

	03000	03010	03020	03030	03040	03050	03060	03070	03080	03090
0	0	0	0	0	0	0	0	0	0	0
1	0	0	0	0	0	0	0	0	0	0
2	0	0	0	0	0	0	0	0	0	0
3	-32512	0	0	0	0	0	0	0	0	0
4	0	0	0	0	0	0	0	0	0	0
5	0	0	0	0	0	0	0	0	0	0
6	0	0	0	0	0	0	0	0	0	0
7	0	0	0	0	0	0	0	0	0	0
8	0	0	0	0	0	0	0	0	0	0
9	0	0	0	0	0	0	0	0	0	0

	04000	04010	04020	04030
0	0	0	0	0
1	0	0	0	0
2	0	0	0	0
3	0	0	0	0
4	0	0	0	0
5	0	0	0	0
6	0	0	0	0
7	0	0	0	0
8	0	0	0	0
9	0	0	0	0

1.5 Measuring range of digital sensors - sensor addr. 1 to 96, MODBUS addr. 5001 to 5096

1.6 Measuring range of analog sensors - sensor addr. 1 to 32, MODBUS addr. 6001 to 6032



The screenshot shows two software windows. The left window, titled 'DGC06_DP_MSB.mbp', displays a table of digital sensor data for addresses 05000 to 05090. The right window, titled 'DGC06_AP_MSB.mbp', displays a table of analog sensor data for addresses 06000 to 06030. Both windows show a status bar at the top with 'Tx =', 'Err = 0:', 'ID = 1:', 'F =', and 'SR = 100ms'.

	05000	05010	05020	05030	05040	05050	05060	05070	05080	05090
0	0	0	0	0	0	0	0	0	0	0
1	300	0	0	0	0	0	0	0	0	0
2	0	0	0	0	0	0	0	0	0	0
3	300	0	0	0	0	0	0	0	0	0
4	0	0	0	0	0	0	0	0	0	0
5	0	0	0	0	0	0	0	0	0	0
6	0	0	0	0	0	0	0	0	0	0
7	0	0	0	0	0	0	0	0	0	0
8	0	0	0	0	0	0	0	0	0	0
9	0	0	0	0	0	0	0	0	0	0

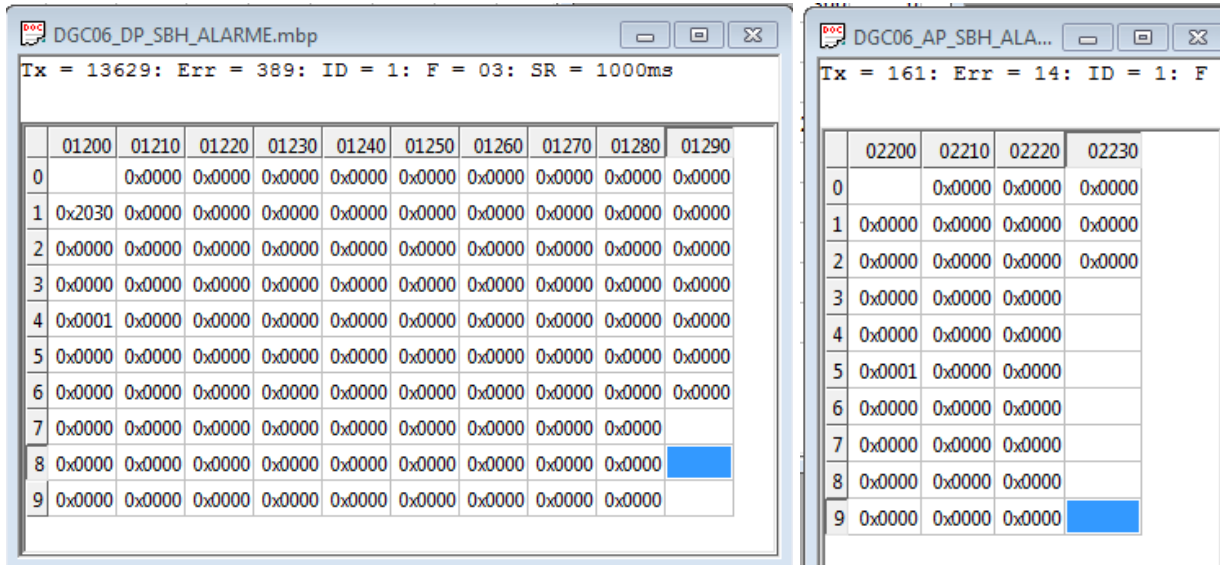
	06000	06010	06020	06030
0	0	0	0	0
1	250	0	0	0
2	250	0	0	0
3	250	0	0	0
4	250	0	0	0
5	0	0	0	0
6	0	0	0	0
7	0	0	0	0
8	0	0	0	0
9	0	0	0	0

1.7 Display of the alarms and the respective latching bits of digital sensors

Display of the local alarms generated by the DGC6 as well as of the respective latching bits of digital sensors - sensor addresses 1 to 96, MODBUS addresses 1201 to 1296

1.8 Display of the alarms and the respective latching bits of analog sensors

Display of the local alarms generated by the DGC6 as well as of the respective latching bits of analog sensors - sensor addresses 1 to 32, MODBUS addresses 2201 to 2232



	01200	01210	01220	01230	01240	01250	01260	01270	01280	01290
0		0x0000	0x0000	0x0000	0x0000	0x0000	0x0000	0x0000	0x0000	0x0000
1	0x2030	0x0000	0x0000	0x0000	0x0000	0x0000	0x0000	0x0000	0x0000	0x0000
2	0x0000	0x0000	0x0000	0x0000	0x0000	0x0000	0x0000	0x0000	0x0000	0x0000
3	0x0000	0x0000	0x0000	0x0000	0x0000	0x0000	0x0000	0x0000	0x0000	0x0000
4	0x0001	0x0000	0x0000	0x0000	0x0000	0x0000	0x0000	0x0000	0x0000	0x0000
5	0x0000	0x0000	0x0000	0x0000	0x0000	0x0000	0x0000	0x0000	0x0000	0x0000
6	0x0000	0x0000	0x0000	0x0000	0x0000	0x0000	0x0000	0x0000	0x0000	0x0000
7	0x0000	0x0000	0x0000	0x0000	0x0000	0x0000	0x0000	0x0000	0x0000	
8	0x0000	0x0000	0x0000	0x0000	0x0000	0x0000	0x0000	0x0000	0x0000	
9	0x0000	0x0000	0x0000	0x0000	0x0000	0x0000	0x0000	0x0000	0x0000	

	02200	02210	02220	02230
0		0x0000	0x0000	0x0000
1	0x0000	0x0000	0x0000	0x0000
2	0x0000	0x0000	0x0000	0x0000
3	0x0000	0x0000	0x0000	
4	0x0000	0x0000	0x0000	
5	0x0001	0x0000	0x0000	
6	0x0000	0x0000	0x0000	
7	0x0000	0x0000	0x0000	
8	0x0000	0x0000	0x0000	
9	0x0000	0x0000	0x0000	

Here, the representation in the hexadecimal form is easier to read because the data are transmitted in the following form:

0xFFFF =

0x	F	F	F	F
0b	1111	1111	1111	1111
	Local latching	DGC6 latching	Local alarms	DGC6 alarms

There are four status bits for the four alarm stages each.

1 = alarm or latching active

0 = alarm or latching not active

The above example:

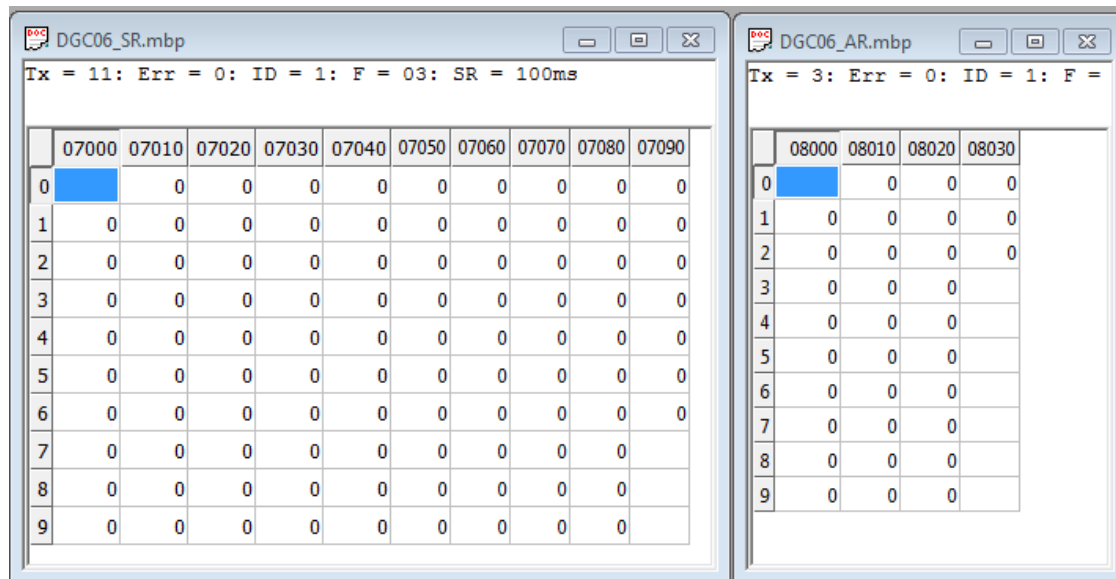
There are two local alarms at DP1, with the second being in latching mode.

The first alarm generated by the DGC6 is present at DP4.

The first alarm generated by the DGC6 is present at AP5.

1.9 Relay status of the signal relays – signal relay addr. 1 to 96, MODBUS addr. 7001 to 7096

1.10 Relay status of the alarm relays– alarm relay addr. 1 to 32, MODBUS addr. 8001 to 8032



	07000	07010	07020	07030	07040	07050	07060	07070	07080	07090
0	0	0	0	0	0	0	0	0	0	0
1	0	0	0	0	0	0	0	0	0	0
2	0	0	0	0	0	0	0	0	0	0
3	0	0	0	0	0	0	0	0	0	0
4	0	0	0	0	0	0	0	0	0	0
5	0	0	0	0	0	0	0	0	0	0
6	0	0	0	0	0	0	0	0	0	0
7	0	0	0	0	0	0	0	0	0	0
8	0	0	0	0	0	0	0	0	0	0
9	0	0	0	0	0	0	0	0	0	0

	08000	08010	08020	08030
0	0	0	0	0
1	0	0	0	0
2	0	0	0	0
3	0	0	0	0
4	0	0	0	0
5	0	0	0	0
6	0	0	0	0
7	0	0	0	0
8	0	0	0	0
9	0	0	0	0

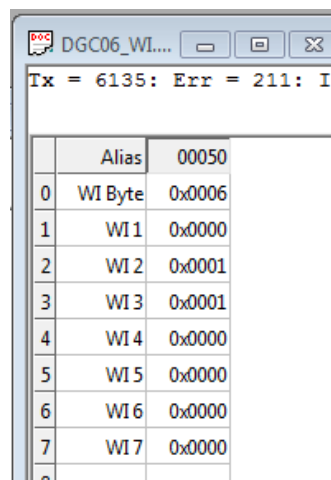
The relay status of the controller’s fault message relay is in register 8000.

1.11 DGC6 Watch Outputs (WI), MODBUS addresses 50 to 57

In register 50, all watch outputs are shown as a byte as used for evaluation in the DGC6 system.

In the registers 51 – 57 the individual bit values are available as Integer values.

- 0 or 0x0000 = No output set
- 1 or 0x0001 = Switch on by clock
- 256 or 0x0100 = Switch on by Modbus
- 257 or 0x0101= Switch on by Modbus and clock



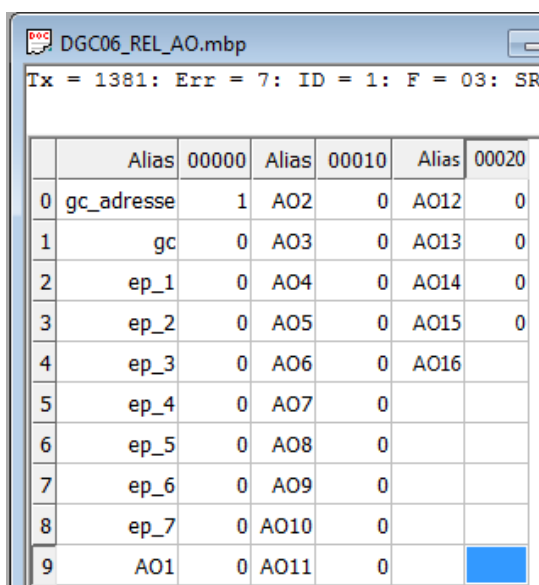
	Alias	00050
0	WI Byte	0x0006
1	WI1	0x0000
2	WI 2	0x0001
3	WI 3	0x0001
4	WI 4	0x0000
5	WI 5	0x0000
6	WI 6	0x0000
7	WI 7	0x0000
8		

1.12 Data block: Output

- Address 0: Own slave MODBUS address at the X Bus
- Address 1: Relay information bits of the first module (Controller Module)
 - Relay 1 is bit 0 to relay 4 is bit 3
- Address 2: Relay information bits of the extension module address_1
 - Relay 5 is bit 0 to relay 8 is bit 3
- Address 3: Relay information bits of the extension module address_2
 - Relay 9 is bit 0 to relay 12 is bit 3
- Address 4: Relay information bits of the extension module address 3
 - Relay 13 is bit 0 to relay 16 is bit 3
- Address 5: Relay information bits of the extension module address_4
 - Relay 17 is bit 0 to relay 20 is bit 3
- Address 6: Relay information bits of the extension module address_5
 - Relay 21 is bit 0 to relay 24 is bit 3
- Address 7: Relay information bits of the extension module address_6
 - Relay 25 is bit 0 to relay 28 is bit 3
- Address 8: Relay information bits of the extension module address_7
 - Relay 29 is bit 0 to relay 32 is bit 3

The addresses 9 to 24 stand for hardware analog output 1 to analog output 16.

The definition of the values is done between 0 and 10000 (full scale value of the sensor).



	Alias	00000	Alias	00010	Alias	00020
0	gc_adresse	1	AO2	0	AO12	0
1	gc	0	AO3	0	AO13	0
2	ep_1	0	AO4	0	AO14	0
3	ep_2	0	AO5	0	AO15	0
4	ep_3	0	AO6	0	AO16	
5	ep_4	0	AO7	0		
6	ep_5	0	AO8	0		
7	ep_6	0	AO9	0		
8	ep_7	0	AO10	0		
9	AO1	0	AO11	0		

2 Modbus-Function 05

Write Single Coil (writing of single states ON/OFF) is used to acknowledge the latching mode or the horns as well as to set clock outputs individually.

2.1 Acknowledgement of latching mode

For this purpose, the command 05 is sent to the address of the DGC6 with the indication of the respective register from 1.7 or 1.8 Display of the alarms.

The acknowledgment only takes place when the value ON(0xFF00) has been sent.

2.2 Acknowledgement of horn

For this purpose, command 05 is sent to the address of DGC6 and register 0x7000.

The acknowledgment only takes place when the value ON(0xFF00) has been sent.

2.3 Activation of the single Watch Output via Modbus

For this purpose, the command 05 is sent to the address of the DGC6 with the indication of the respective register from 1.12 Display of the Watch Outputs with register 50 not being allowed.

3 Modbus Function 06

Write Single Registers (writing of single registers) is used to write on individual registers in the DGC6.

Currently, it is only possible to write on the own slave address.

Modbus address 0 (cf. 1.12)

4 Modbus-Function 15

Write Multiple Coil (writing multiple states OFF/ON) is used to set all watch outputs at once. The command must be sent to DGC6 address with the indication of register 50 with a maximum length of 7 bits.

5 Modbus Function 16

Write Multiple Registers (writing of several registers) is used to write on several registers in the DGC6.

Currently, it is only possible to write on the own slave address.

Modbus address 0 (cf. 1.12)

All other parameter changes are not permitted for safety reasons; therefore, the data direction is clearly defined from the warning system to the open MODBUS side. Retroaction is not possible.

6 Notes and General Information

It is important to read this user manual carefully in order to understand the information and instructions. The PolyGard® DGC6 gas monitoring, control and alarm system may only be used for applications in accordance to the intended use. The appropriate operating and maintenance instructions and recommendations must be followed.

Due to permanent product developments, MSR reserves the right to change specifications without notice. The information contained herein is based on data considered to be accurate. However, no guarantee or warranty is expressed or implied concerning the accuracy of these data.

6.1 Intended Product Application

The PolyGard® DGC6 is designed and manufactured for controlling, for saving energy and keeping OSHA air quality in commercial buildings and manufacturing plants.

6.2 Installer's Responsibilities

It is the installer's responsibility to ensure that all PolyGard® DGC6 are installed in compliance with all national and local regulations and OSHA requirements. All installation shall be executed only by technicians familiar with proper installation techniques and with codes, standards and proper safety procedures for control installations and the latest edition of the National Electrical Code (ANSI/NFPA70).

The equipotential bonding required (also e.g. secondary potential to earth) or grounding measures must be carried out in accordance with the respective project requirements. It is important to ensure that no ground loops are formed to avoid unwanted interference in the electronic measuring equipment.

It is also essential to follow strictly all instructions as provided in the user manual.

6.3 Maintenance

We recommend checking the PolyGard® DGC6 system regularly. Due to regular maintenance differences in efficiency can easily be corrected. Re-calibration and replacement of parts can be realised on site by a qualified technician with the appropriate tools. Alternatively the removable Gas Controller can be returned to MSR-Electronic GmbH for services.

6.4 Limited Warranty

INTEC Controls & MSR-Electronic GmbH warrants the PolyGard® DGC6 against defects in material or workmanship for a period of two (2) years beginning from the date of shipment. Should any evidence of defects in material or workmanship occur during the warranty period, MSR will repair or replace the product at their own discretion, without charge.

This warranty does not apply to units that have been altered, had attempted repair, or been subjected to abuse, accidental or otherwise. The above warranty is in lieu of all other explicit warranties, obligations or liabilities.

This warranty extends only to the PolyGard® DGC6. INTEC Controls and MSR-Electronic GmbH shall not be liable for any incidental or consequential damages arising out of or related to the use of the PolyGard® DGC6.