P60

Heavy Duty Environmental Sensor

TECHNICAL REFERENCE GUIDE   VOLUME 1.0

FIGURE 1 P60 HEAVY DUTY ENVIRONMENTAL SENSOR

Contents

List of figures

1. Introduction

About this manual

This manual was prepared to aid the engineer in the configuration, setup and implementation of the P60 in systems with easy to understand terms and procedures.

About the P60

The P60 Heavy Duty Environmental Sensor is the most robust environmental sensor on the market to date. It is constructed from high grade 304 Stainless steel, to withstand the harshest conditions.

The P60 offers high accuracy measurement of:

- Carbon Monoxide (CO)

- Methane (CH4)

- Oxygen (O2)

- Carbon Dioxide (CO2)

The P60 is manufactured to international standards utilizing the best components available. We offer 24/7 toll free technical support, backup service and training.

The P60 has all the following functions available.

- RS485 Modbus RTU communication

- User selectable warning levels for all gasses

- User selectable alarm levels for all gasses

- User selectable warning and alarm delay times

P60 HMI (human machine interface)

The P60 operates as a user friendly device with colour indication. All the measurements and data are available to the network via MODBUS RTU RS485.

Colour	DESCRIPTION
Green	All sensors within acceptable range
Orange/Yellow	One or more sensors have entered the warning range
Red	One or more sensors have entered the alarm range
Blue	Changes have been saved to device

2. Warranty

The P60 carries a one year limited warranty on all parts and labour

3. Safety information

- ❖ Dangerous voltages can occur on the connectors, even if the auxiliary voltage has been disconnected.
- ❖ Only a certified electrician is allowed to carry out the electrical installation.
- ❖ Breaking the seal on the fixing screws of the device will result in loss of warranty.
- ❖ Electrical safety regulations must always be followed.

4. P60 Configuration

About the configuration

The P60 is a configurable Heavy duty Environmental Sensor. The P60 can be configured with the configuration program. The program is a Daq Factory based GUI (graphical user interface) program to configure the P60 via Modbus RTU.

The configuration allows the engineer:

- Adjustment of warning level

- Adjustment of warning delay

- Adjustment of alarm level

- Adjustment of alarm delay

- LED test function

- Graphical view of sensor readings

Note: The P60 comes standard with the default levels and delays loaded into memory.
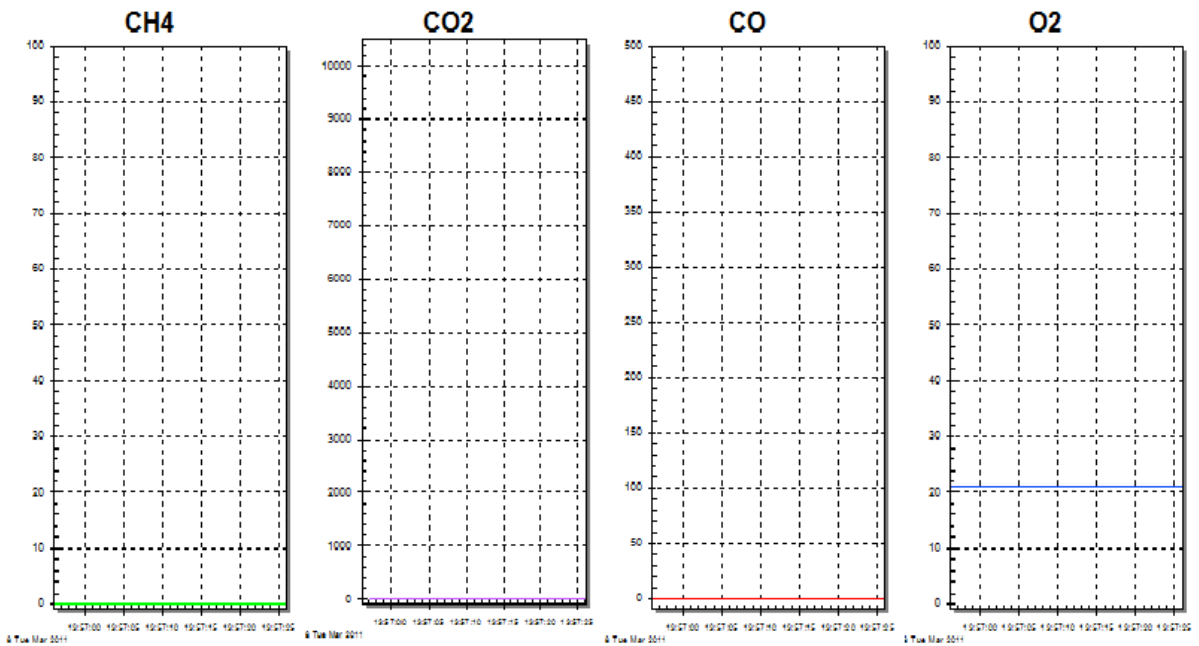
Configuration:

FIGURE 2 P60 CONFIGURATION SCREEN

5.   Communication

About communication

The P60 offers RS485 (Modbus RTU) communication.

Modbus RTU Protocol

The protocol for Modbus RTU consists of a string of bytes. The string starts with the RS485 address, the function required, addresses, data bytes and ends with CRC (cyclic redundancy check).

Read input registers 30000

The real time voltage and current measurements and other important data are available on the input registers.

Below is a list of the available input registers.

REGISTER	NAME	DESCRIPTION	UNIT
30000	Input Voltage	Future Use	
30001	Unit Temperature	Future Use	
30002	Status	Bit Wise	
30003	Sensor CO	Reading 0-5000	Ppm
30004	Sensor CH4	Reading 0-50 Ex. 14=1.4%	%
30005	Sensor O2	Reading 0-300 Ex. 209=20.9%	%
30006	Sensor CO2	Reading 0-30000	Ppm
30016	Communications Counter	Reading 0-65535	Sec
30017	CO Alarm Timer	Reading 0-65535	Sec
30018	CH4 Alarm Timer	Reading 0-65535	Sec
30019	O2 Alarm Timer	Reading 0-65535	Sec
30020	CO2 Alarm Timer	Reading 0-65535	Sec
30021	CO Warning Timer	Reading 0-65535	Sec
30022	CH4 Warning Timer	Reading 0-65535	Sec
30023	O2 Warning Timer	Reading 0-65535	Sec
30024	CO2 Warning Timer	Reading 0-65535	Sec

All input registers are 16 bit in length.

Example – Read CO, CO2, O2 and CH4

Example - Slave address = 5

Read request

Slave Address	Function	Start Address Hi	Start Address Lo	No Points Hi	No Points Lo	CRC Lo	CRC Hi
05	04	00	03	00	04	CRC	CRC

Read response

Slave Address	Function	Byte Count	Data Hi	Data Lo	……..	Data Hi	Data Lo	CRC Lo	CRC Hi
05	04	8Hex	XX	XX	XX	XX	XX	XX	XX

Holding registers 40000

The menu settings are available for read and write and are located in the holding registers.

REGISTER	NAME	Description	Comment
40000	Serial No H	Serial No H	Read only
40001	Serial No L	Serial No L	Read only
40002	Model Version	Model Version	Read only
40003	Last Calibration Date H	Last Calibration Date H	Read only
40004	Last Calibration Date L	Last Calibration Date L	Read only
40005	Next Calibration Date H	Next Calibration Date H	Read only
40006	Next Calibration Date L	Next Calibration Date L	Read only
40007	Sample rate	Sample rate	Read only
40008	Buzzer Length On	Buzzer Length On	Read only
40009	Buzzer Length Off	Buzzer Length Off	Read only
40010	Power on delay	Power on delay	Read only
40011	RS485 Address	RS485 Address	Read only
40012	Samples	Samples	Read only
40013	Co Configuration	Co Configuration	Read only
40014	CH4 Configuration	CH4 Configuration	Read only
40015	O2 Configuration	O2 Configuration	Read only
40016	CO2 Configuration	CO2 Configuration	Read only
40037	CO Warning Level	Default 100 ppm	
40038	CH4 Warning Level	Default 1.0 % (10)	
40039	O2 Warning Level	Default 18% (180)	
40040	CO2 Warning Level	10000ppm	
40041	CO Warning Delay	Default 30 Sec	
40042	CH4 Warning Delay	Default 30 Sec	
40043	O2 Warning Delay	Default 30 Sec	
40044	CO2 Warning Delay	Default 30 Sec	
40045	CO Alarm Level	130ppm	
40046	CH4 Alarm Level	1.4% (14)	
40047	O2 Alarm Level	15% (150)	
40048	CO2 Alarm Level	15000 ppm	
40049	CO Alarm Delay	Default 30 Sec	
40050	CH4 Alarm Delay	Default 30 Sec	
40051	O2 Alarm Delay	Default 30 Sec	
40052	CO2 Alarm Delay	Default 30 Sec	
40053	CO Type	CO Type	Read only
40054	CH4 Type	CH4 Type	Read only
40055	O2 Type	O2 Type	Read only
40056	CO2 Type	CO2 Type	Read only

All input registers are 16 bit in length.

Example – Read all holding registers

Example - Slave address = 5

Read request

Slave Address	Function	Start Address Hi	Start Address Lo	No Points Hi	No Points Lo	CRC Lo	CRC Hi
05	03	00	00	00	43	04	51

Read response

Slave Address	Function	Byte Count	Data Hi	Data Lo	……..	Data Hi	Data Lo	CRC Lo	CRC Hi
05	03	86	XX	XX	XX	XX	XX	XX	XX

Example – Write to holding registers

Example - Slave address = 5

Write request

Slave Address	Function	Start Address Hi	Start Address Lo	No Registers Hi	No Registers Lo	Byte Count	Data Hi	Data Lo	CRC Lo	CRC Hi
05	10	00	00	00	XX	XX	XX	XX	XX	XX

Write response

Slave Address	Function	Start Address Hi	Start Address Lo	No of Registers Hi	No of Registers Lo	CRC Lo	CRC Hi
05	10	00	00	00	XX	XX	XX

Coil registers 0000

The menu settings are available for read and write and are located in the holding registers.

REGISTER	NAME	Description
0x0008	Save Settings	Save Settings after change
0x0009	Test Led's	Test Led's

Save Settings Coil must be activated after any of the holding register values are changed, to commit changes to the device.

6.   Approvals and Marking

SAEx M/03056 X
SANS 60079-0:2000 Part 0
SANS 60079-11:1999 Part II
SABS 549

MARKING ON MAIN UNIT
Manufacturer NINGI Services
Type: P60 Ver 1.1
Serial No's: T0801A01 to T0801F01 (inclusive) Example
Ex Rating: Ex ia I
IA No: MASC M/10-218x
$U_i = 15$ V $I_i = 8A$ $P_i = 3W$ $C_i = 0$ $L_i = 48uH$

ADDITIONAL MARKING
RS485:
$U_o = 5,88Vdc$ $U_i = 18V$
$I_o = 130mA$
$P_o = 200mW$ $P_i = 3W$
$C_o = 100\mu F$ $C_i = 1,2\mu F$
$L_o = 20mH$

Special Conditions of use (X):
• No connections (data lines) may be made to the equipment unless it forms part of a certified system, incorporating the assigned safety parameters.
• A barrier / isolator connected to the RS485 interface shall have a 100mA or lower fuse in place, or Po (Power Out) of the barrier / isolator shall not exceed 1,2W.
• The programming connector may only be used outside the hazardous location, with no connected circuits into the hazardous location.

7. Electrical specifications

	Min	Typical	Max	Unit
Control voltage	9	12	15	VDC
Power consumption		1.3 W		W
Communication channel RS485 (MODBUS RTU)		9600		bps

8.   Terms and conditions

Product Agreement

PTYTRADE384 (PTY) LTD reserves the right to make changes without further notice to any products herein.

The use of the P60 indicates your understanding and acceptance of the following terms and conditions. This agreement shall supersede any verbal or prior verbal or written, statement or agreement to the contrary. If you do not understand or accept these terms, or your local regulations prohibit "after sale" product agreements or limited disclaimers, you must cease and desist using this product immediately.

This product is © Copyright 1998-2005 by PTYTRADE384 (PTY) LTD, all rights reserved. International copyright laws, international treaties and all other applicable national or international laws protect this product. This product and documentation may not, in whole or in part, be copied, translated, or reduced to any electronic medium or machine readable form, without prior consent in writing, from PTYTRADE384 (PTY) LTD and according to all applicable laws.

The sole owners of this product are PTYTRADE384 (PTY) LTD and NINGI SERVICES

LIABILITY DISCLAIMER

PTYTRADE384 (PTY) LTD makes no warranty, representation or guarantee regarding the suitability of its products for any particular purpose, nor does PTYTRADE384 (PTY) LTD assume any liability arising out of the application or use of any product or circuit, and specifically disclaims any and all liability, including without limitation consequential or incidental damages. "Typical" parameters which may be provided in the data sheets and/or specifications can and do vary in different applications and actual performance may vary over time. All operating parameters, including "Typical" must be validated for each customer application by customer's technical experts. PTYTRADE384 (PTY) LTD does not convey any license under its patent rights nor the rights of others. PTYTRADE384 (PTY) LTD products are not designed, intended, or authorized for use as components in systems intended for surgical implant into the body, or other applications intended to support or sustain life, or for any other application in which the failure of the PTYTRADE384 (PTY) LTD product could create a situation where personal injury or death may occur. Should the customer use PTYTRADE384 (PTY) LTD products for any such unintended or unauthorized application, the customer shall indemnify and hold PTYTRADE384 (PTY) LTD and its officers, employees, subsidiaries, affiliates, and distributors harmless against all claims, costs, damages, and expenses, and attorney fees arising out of, directly or indirectly, any claim of personal injury or death associated with such unintended or unauthorized use, even if such claim alleges that PTYTRADE384 (PTY) LTD was negligent regarding the design or manufacture of the part. P60 is a registered trademark of PTYTRADE384 (PTY) LTD. PTYTRADE384 (PTY) LTD does not assume liability for the use of this product beyond the original purchase price of the product.

RESTRICTIONS

You may not use, copy or modify any documentation as expressly defined in this agreement. You may not attempt to unlock or bypass any authentication algorithm utilized by the product. You may not remove or modify any copyright notice or the method by which it may be invoked.

OTHER RIGHTS AND RESTRICTIONS

All other rights and restrictions not specifically granted in this agreement are reserved by PTYTRADE384 (PTY) LTD.