H2scan
ADVANCED HYDROGEN SENSING

MODBUS REGISTER MAP

GSAO-2

Control Hub

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IMPORTANT NOTICES

Read and understand this operation manual before installing or using the unit.

Use of this equipment in a manner not specified by H2scan may void the warranty.

LIMITATION OF LIABILITY - seller shall under no circumstances be liable for any incidental, consequential, special, punitive, or other damages, including, but not limited to, loss of business or profit, promotional or manufacturing expenses, injury to reputation, or loss of customer, based on any alleged negligence, breach of warranty, strict liability, breach of contract, or any other legal theory arising out of the use, misuse, purchase, sale or possession of its goods or its performance of this contract to the extent that such liability extends seller's obligations beyond the price paid by buyer to seller for the item on which such claim is based. Seller advises buyer to perform acceptable tests on all hardware prior to deployment and to perform maintenance as described in the seller's instruction guide. Under no circumstances shall the equipment provided hereunder be used in a manner where it is the sole protective system for facilities, equipment, and personnel safety; the equipment is intended for use in conjunction with other appropriate protective systems.

LIMITED WARRANTY

H2scan Limited Warranty: Each GSAO-2 Control Hub ("Product") will conform, as to all substantial operational features, to the Product specifications set forth in this Manual and will be free of defects which substantially affect such Product's performance for 36 months from the ship date for such Product.

Must Provide Notice of Defect: If you have a Product that you believe is defective, you must notify H2scan in writing, within the warranty period of your claim regarding any such defect.

Return Product to H2scan for Repair, Replacement or Credit: The customer is responsible for shipping and handling costs. If the Product is found defective by H2scan, H2scan's sole obligation under this warranty is to either (i) repair the Product, (ii) replace the Product, or (iii) issue a credit for the purchase price for such Product, the remedy to be determined by H2scan on a case-by-case basis. A valid RMA number must be assigned by H2scan and clearly marked on the package when the unit is returned.

Voided Warranty: H2scan's 36-Month Limited Warranty is void for any of the following:

- Unauthorized repair work of the GSAO-2 Control Hub performed at the customer's location or conducted by anyone other than H2scan's factory trained technicians.
- Equipment or parts that have been tampered with, misused, neglected, mishandled, improperly adjusted, or modified in any way without the written consent of H2scan.
- Equipment or parts that have been damaged due to shipping, misuse, accidents, mishandling, neglect, or problems with electrical power sources.
- Repair work performed during the warranty period does not prolong the warranty period past the original period.
- System operation in incorrect or inappropriate environments.
- Usage that is not in accordance with system guidelines or an operator's failure to follow manual instructions.

Limitation of Warranty: THE ABOVE IS A LIMITED WARRANTY AS IT IS THE ONLY WARRANTY MADE BY H2SCAN. H2SCAN MAKES NO OTHER WARRANTY EXPRESSED OR IMPLIED AND EXPRESSLY EXCLUDES ALL WARRANTIES OF MERCHANTABILITY AND FITNESS FOR A PARTICULAR PURPOSE. YOUR SOLE REMEDY HEREUNDER IS REPAIR OR REPLACEMENT OF THE PRODUCT OR A CREDIT FOR THE PURCHASE PRICE FOR SUCH PRODUCT, THE PARTICULAR REMEDY TO BE DETERMINED BY H2SCAN ON A CASE-BY-CASE BASIS. H2SCAN SHALL HAVE NO LIABILITY WITH RESPECT TO ITS OBLIGATIONS UNDER THIS AGREEMENT FOR CONSEQUENTIAL, EXEMPLARY, OR INCIDENTAL DAMAGES, EVEN IF IT HAS BEEN ADVISED OF THE POSSIBILITY OF SUCH DAMAGES. THE STATED EXPRESS WARRANTY IS IN LIEU OF ALL LIABILITIES OR OBLIGATIONS OF H2SCAN FOR DAMAGES ARISING OUT OF OR IN CONNECTION WITH THE DELIVERY, USE OR PERFORMANCE OF THE PRODUCTS.

GRIDSCAN® Hydrogen Monitor #1					
Register	Parameter	Function	Data Type	Data Range	Access
0	Hydrogen, ppm H_2	High word	32-bit binary number	0–20,000,000	R
1		Low word			
7	PCB Temperature, Celsius	x100 scale; 100 offset (T=V/100-100)	16-bit binary number	-100–+200	R
8	Liquid Temp	x100 scale; 100 offset (T=V/100-100)	16-bit binary number	-100–+200	R
22	Moisture, %RH	x10 scale	16-bit binary number	0–100	R
23	Pressure Gauge, ATM	x1000 scale	16-bit binary number	0–2041	R
24	Moisture, ppm	x1 scale	16-bit binary number	0–10000	R
31–40	Model Number	Set in the factory	ASCII String	Maximum string length is 19, NULL terminated	R
41–50	Serial Number	Set in the factory	ASCII String	Maximum string length is 19, NULL terminated	R
111	Status		16-bit binary flags	For reference definitions, see GRIDSCAN® Modbus Register Map	R
112	Error Status	High word	32-bit binary flags	For reference definitions, see GRIDSCAN® Modbus Register Map	R
113		Low word			

GRIDSCAN® Hydrogen Monitor #2					
Register	Parameter	Function	Data Type	Data Range	Access
256	Hydrogen, ppm H_2	High word	32-bit binary number	0–20,000,000	R
257		Low word			
263	PCB Temperature, Celsius	x100 scale; 100 offset (T=V/100-100)	16-bit binary number	-100–+200	R
264	Liquid Temp	x100 scale; 100 offset (T=V/100-100)	16-bit binary number	-100–+200	R
278	Moisture, %RH	x10 scale	16-bit binary number	0–100	R
279	Pressure Gauge, ATM	x1000 scale	16-bit binary number	0–2041	R
280	Moisture, ppm	x1 scale	16-bit binary number	0–10000	R
287–296	Model Number	Set in the factory	ASCII String	Maximum string length is 19, NULL terminated	R
297–306	Serial Number	Set in the factory	ASCII String	Maximum string length is 19, NULL terminated	R
367	Status		16-bit binary flags	For reference definitions, see GRIDSCAN® Modbus Register Map	R
368	Error Status	High word	32-bit binary flags	For reference definitions, see GRIDSCAN® Modbus Register Map	R
369		Low word			

GSAO-2 Control Hub					
Register	Parameter	Function	Data Type	Data Range	Access
1003–1004	Uptime Since Restart (seconds)	High word	32-bit binary number		R
		Low word			
1005	Real-Time Clock Date/Time	High byte: Month Low byte: Day	16-bit binary number	For reference definitions, see GRIDSCAN® Modbus Register Map	R
1006	Real-Time Clock Date/Time	Year	16-bit binary number		R
1007	Real-Time Clock Date/Time	High byte: Hour Low byte: Minute	16-bit binary number		R
1008	Real-Time Clock Date/Time	Seconds in Milliseconds (uint16_t, big endian)	16-bit binary number		R
1009	GSAO-2 Status	GSAO-2 status results including reboot reason and current GSAO-2 state	16-bit binary number	0x#001 POST 0x#002 STARTUP = 2; 0x#003 RUN = 3; 0x#004 CONFIGURATION = 4; 0x#005 SERVICE = 5; 0x#006 FIRMWARE_UPDATE = 6; 0x#007 DATA_DOWNLOAD = 7; 0x#010 SYSTEM_FAULT = 8; 0x0### ResetReason_PowerOn, 0x1### ResetReason_Software, 0x2### ResetReason_LowPower, 0x3### ResetReason_Watchdog, 0x4### ResetReason_Button, 0x5### ResetReason_BrownOut, 0xF### ResetReason_Unknown,	R
1010	POST Status	Power On Self Test status results	16-bit binary number	Each bit represents a different POST error condition 0x0001 POST_BRD_TYPE_ERR 0x0002 POST_PCB_TEMP_ERR 0x0004 POST_ETHERNET_ERR 0x0008 POST_AD5755_ERR 0x0010 POST_FLASH_MEM_ERR 0x0020 POST_DAC_ERR 0x0040 POST_ADC_ERR 0x0080 POST_USB_ERR	R
1012	Relay Status	Relay status bitmap	16-bit binary number	0x0000 = None active 0x0001 = Relay #1 active 0x0002 = Relay #2 active 0x0004 = Relay #3 active 0x0008 = Relay #4 active	R
1013	H_2 Alarm Status	H_2 alarm status bitmap	16-bit binary number	0x0000 = No active alarm 0x0001 = Input #1 active 0x0002 = Input #2 active	R

Register	Parameter	Function	Data Type	Data Range	Access
1014	Liquid Temperature Alarm Status	Liquid temperature alarm status bitmap	16-bit binary number	0x0000 = No active alarm 0x0001 = Input #1 active 0x0002 = Input #2 active	R
1015	Pressure Alarm Status	Pressure alarm status bitmap	16-bit binary number	0x0000 = No active alarm 0x0001 = Input #1 active 0x0002 = Input #2 active	R
1016	Moisture Alarm Status	Moisture alarm status bitmap	16-bit binary number	0x0000 = No active alarm 0x0001 = Input #1 active 0x0002 = Input #2 active	R
1019	H_2 Caution Status	H_2 caution status bitmap	16-bit binary number	0x0000 = No active alarm 0x0001 = Input #1 active 0x0002 = Input #2 active	R
1020	Liquid Temperature Caution Status	Liquid temperature caution status bitmap	16-bit binary number	0x0000 = No active alarm 0x0001 = Input #1 active 0x0002 = Input #2 active	R
1021	Pressure Caution Status	Pressure caution status bitmap	16-bit binary number	0x0000 = No active alarm 0x0001 = Input #1 active 0x0002 = Input #2 active	R
1022	Moisture Caution Status	Moisture caution status bitmap	16-bit binary number	0x0000 = No active alarm 0x0001 = Input #1 active 0x0002 = Input #2 active	R

Register	Parameter	Function	Data Type	Data Range	Access
1047	Relay 1 Cfg	Trigger Type, Sensor Type, Alarm Type, Enabled	16-bit binary number	WWXX 0YYY 00ZZ 000E (16 bits) Input Source: WW = 00 input source 0 = 01 input source 1 = 10 input source 2 = 11 input source 3 Trigger Type: XX = 00 Unknown = 01 IN_SERVICE = 10 ALARM_CONDITION Sensor Type: YYY = 000 Undefined (IN_SERVICE Sensor Type uses this Alarm_Type) = 001 H_2 = 010 LQD TEMP = 101 MOISTURE RS% = 110 PRESSURE = 111 MOISTURE PPM (WATER) Alarm Type: ZZ = 00 Alarm OFF = 01 Alarm CAUTION = 10 Alarm ALARM Enabled: E = 0 Disabled = 1 Enabled	R

Register	Parameter	Function	Data Type	Data Range	Access
1048	Relay 2 Cfg	Trigger Type, Sensor Type, Alarm Type, Enabled	16-bit binary number	WWXX 0YYY 00ZZ 000E Input Source: WW = 00 input 0 = 01 input source 1 = 10 input source 2 = 11 input source 3 Trigger Type: XX = 00 Unknown = 01 IN_SERVICE = 10 ALARM_CONDITION Sensor Type: YYY = 000 Undefined (IN_SERVICE Sensor Type uses this Alarm_Type) = 001 H_2 = 010 LQD TEMP = 101 MOISTURE RS% = 110 PRESSURE = 111 MOISTURE PPM (WATER) Alarm Type: ZZ = 00 Alarm OFF = 01 Alarm CAUTION = 10 Alarm ALARM Enabled: E = 0 Disabled = 1 Enabled	R
1049	Relay 3 Cfg	Trigger Type, Sensor Type, Alarm Type, Enabled	16-bit binary number	WWXX 0YYY 00ZZ 000E Input Source: WW = 00 input 0 = 01 input source 1 = 10 input source 2 = 11 input source 3 Trigger Type: XX = 00 Unknown = 01 IN_SERVICE = 10 ALARM_CONDITION Sensor Type: YYY = 000 Undefined (IN_SERVICE Sensor Type uses this Alarm_Type) = 001 H_2 = 010 LQD TEMP = 101 MOISTURE RS% = 110 PRESSURE = 111 MOISTURE PPM (WATER) Alarm Type: ZZ = 00 Alarm OFF = 01 Alarm CAUTION = 10 Alarm ALARM Enabled: E = 0 Disabled = 1 Enabled	R

Register	Parameter	Function	Data Type	Data Range	Access
1050	Relay 4 Cfg	Trigger Type, Sensor Type, Alarm Type, Enabled	16-bit binary number	WWXX 0YYY 00ZZ 000E Input Source: WW = 00 input 0 = 01 input source 1 = 10 input source 2 = 11 input source 3 Trigger Type: XX = 00 Unknown = 01 IN_SERVICE = 10 ALARM_CONDITION Sensor Type: YYY = 000 Undefined (IN_SERVICE Sensor Type uses this Alarm_Type) = 001 H_2 = 010 LQD TEMP = 101 MOISTURE RS% = 110 PRESSURE = 111 MOISTURE PPM (WATER) Alarm Type: ZZ = 00 Alarm OFF = 01 Alarm CAUTION = 10 Alarm ALARM Enabled: E = 0 Disabled = 1 Enabled	R
1075	Sensor Modbus Parity/Stop Bit	Sensor Modbus comms parameters	16-bit number	T000 00XX Terminated: T = 8 Terminated T = 0 Not Terminated Data Bits, Parity, Stop Bits: XX = 1 = 8N1 2 = 8N2 3 = 8E1 4 = 8E2 5 = 8O1 6 = 8O2	R
1076	Sensor Modbus Baud rate	Sensor comms speed	16-bit number	0x0001 = 9600 0x0003 = 19200	R
1077	GRIDSCAN® 1 Device ID	MB Address of GRIDSCAN® 1	16-bit number	1–247	R
1078	GRIDSCAN® 1 Status	State of this GRIDSCAN® 1	16-bit number	1 = Not Ready (H_2 not ready) 2 = Ready (H_2 ready) 3 = Lost Communication 6 = Not Found (configured, not found) 8 = Fault State 9 = Not Configured	R
1081	GRIDSCAN® 2 Device ID	MB Address of GRIDSCAN® 2	16-bit number	1–247	R

Register	Parameter	Function	Data Type	Data Range	Access
1082	GRIDSCAN® 2 Status	State of this GRIDSCAN® 2	16-bit number	1 = Not Ready (H_2 not ready) 2 = Ready (H_2 ready) 3 = Lost Communication 6 = Not Found (configured, not found) 8 = Fault State 9 = Not Configured	R
1086	SCADA Modbus ID	MB Address of GSAO-2	16-bit number	1–247	R
1087	SCADA Modbus Parity/Stop Bit	SCADA Modbus comms parameters	16-bit number	T000 00XX Terminated: T = 8 Terminated T = 0 Not Terminated Data Bits, Parity, Stop Bits: XX = 1 = 8N1 2 = 8N2 3 = 8E1 4 = 8E2 5 = 8O1 6 = 8O2	R
1088	SCADA Modbus Baud rate	SCADA/Host port comms speed	16-bit number	0x0001 = 9600 0x0003 = 19200	R
1090–1099	Model Number	19 characters + NULL char (20 bytes)	ASCII String	19 characters + NULL char (20 bytes)	R
1100–1109	Serial Number	19 characters + NULL char (20 bytes)	ASCII String	19 characters + NULL char (20 bytes)	R
1110–1119	Firmware Revision	GSAO-2 Firmware Identification	ASCII String	19 characters + NULL char (20 bytes)	R
1120	Firmware Install Date	Month/Day	16-bit binary number	high byte: Month (1–12), low byte: Day (1–31)	R
1121		Year	16-bit binary number	YYYY	
1122	GRIDSCAN® Input 1, Cfg	Current Status: GRIDSCAN® Model, Calibration Type (Liquid) 0000 if cfg is not valid	16-bit binary number	00XY: GRIDSCAN® Model: X = 0 Unknown = 1 GS5000 = 2 GS6000 Calibration Type: Y = 0 Unknown = 2 Liquid	R

Register	Parameter	Function	Data Type	Data Range	Access
1123	GRIDSCAN® Input 1, H_2 Cfg	GRIDSCAN® Input 1 H_2 configuration details	16-bit binary number	0000 0000 XXXX 0YZE: Sensor Type: X = 0 Undefined = 0001 = 1 H_2 Caution Set: Y = 0 Disabled = 0100 = 4 Enabled Alarm Set: Z = 0 Disabled = 0010 = 2 Enabled Enabled: E = 0 Disabled = 0001 = 1 Enabled	R
1124	GRIDSCAN® Input 1, H_2, Caution Setpoint	Caution Setpoint Limits, if enabled (min,max), 0xFFFF if not enabled x1 scale	16-bit binary number	High Word Max	R
1125			16-bit binary number	Low Word Max	
1126			16-bit binary number	High Word Min	
1127			16-bit binary number	Low Word Min	
1128	GRIDSCAN® Input 1, H_2, Alarm Setpoint	Alarm Setpoint Limits, if enabled, 0xFFFF if not enabled x1 scale	16-bit binary number	High Word Max	R
1129			16-bit binary number	Low Word Max	
1130			16-bit binary number	High Word Min	
1131			16-bit binary number	Low Word Min	
1132	GRIDSCAN® Input 1, Liquid Temperature, Cfg	GRIDSCAN® Input 1 Liquid Temperature configuration details	16-bit binary number	0000 0000 XXXX 0YZE: Sensor Type: X = 0 Undefined = 0010 = 2 Liquid Temp Caution Set: Y = 0 Disabled = 0100 = 4 Enabled Alarm Set: Z = 0 Disabled = 0010 = 2 Enabled Enabled: E = 0 Disabled = 0001 = 1 Enabled	R
1133	GRIDSCAN® Input 1, Liquid Temperature, Caution Setpoint	Caution Setpoint Limits if enabled, 0xFFFF if not enabled x1 scale	16-bit binary number	Max	R
1134			16-bit binary number	Min	
1135	GRIDSCAN® Input 1, Liquid Temperature, Alarm Setpoint	Alarm Setpoint Limits if enabled, 0xFFFF if not enabled x1 scale	16-bit binary number	Max	R
1136			16-bit binary number	Min	

Register	Parameter	Function	Data Type	Data Range	Access
1137	GRIDSCAN® Input 1, Moisture, Cfg	GRIDSCAN® Input 1 Moisture configuration details	16-bit binary number	0000 0000 XXXX 0YZE: Sensor Type: X = 0 Undefined = 0101 = 5 Moisture Caution Set: Y = 0 Disabled = 0100 = 4 Enabled Alarm Set: Z = 0 Disabled = 0010 = 2 Enabled Enabled: E = 0 Disabled = 0001 = 1 Enabled	R
1138	GRIDSCAN® Input 1, Moisture, Caution Setpoint	Caution Setpoint Limits if enabled, 0xFFFF if not enabled x10 scale	16-bit binary number	Max	R
1139			16-bit binary number	Min	
1140	GRIDSCAN® Input 1, Moisture, Alarm Setpoint	Alarm Setpoint Limits if enabled, 0xFFFF if not enabled x10 scale	16-bit binary number	Max	R
1141			16-bit binary number	Min	
1142	GRIDSCAN® Input 1, Pressure Cfg	GRIDSCAN® Input 1 Pressure configuration details	16-bit binary number	0000 0000 XXXX 0YZE: Sensor Type: X = 0 Undefined = 0110 = 6 Pressure Caution Set: Y = 0 Disabled = 0100 = 4 Enabled Alarm Set: Z = 0 Disabled = 0010 = 2 Enabled Enabled: E = 0 Disabled = 0001 = 1 Enabled	R
1143	GRIDSCAN® Input 1, Pressure, Caution Setpoint	Caution Setpoint Limits if enabled, 0xFFFF if not enabled x1000 scale	16-bit binary number	Max	R
1144			16-bit binary number	Min	
1145	GRIDSCAN® Input 1, Pressure, Alarm Setpoint	Alarm Setpoint Limits if enabled, 0xFFFF if not enabled x1000 scale	16-bit binary number	Max	R
1146			16-bit binary number	Min	
1156	GRIDSCAN® Input 2, Cfg	Current Status: GRIDSCAN® Model, Calibration Type (Liquid) 0000 if cfg is not valid	16-bit binary number	00XY: Input Type: X = 0 Unknown = 1 GS5000 = 2 GS6000 Calibration Type: Y = 0 Unknown = 2 Liquid	R

Register	Parameter	Function	Data Type	Data Range	Access
1157	GRIDSCAN® Input 2, H_2, Cfg	GRIDSCAN® Input 2 H_2 configuration details	16-bit binary number	0000 0000 XXXX 0YZE: Sensor Type: X = 0 Undefined = 0001 = 1 H_2 Caution Set: Y = 0 Disabled = 0100 = 4 Enabled Alarm Set: Z = 0 Disabled = 0010 = 2 Enabled Enabled: E = 0 Disabled = 0001 = 1 Enabled	R
1158	GRIDSCAN® Input 2, H_2, Caution Setpoint	Caution Setpoint Limits if enabled, 0xFFFF if not enabled x1 scale	16-bit binary number	High Word Max	R
1159			16-bit binary number	Low Word Max	
1160			16-bit binary number	High Word Min	
1161			16-bit binary number	Low Word Min	
1162	GRIDSCAN® Input 2, H_2, Alarm Setpoint	Alarm Setpoint Limits if enabled, 0xFFFF if not enabled x1 scale	16-bit binary number	High Word Max	R
1163			16-bit binary number	Low Word Max	
1164			16-bit binary number	High Word Min	
1165			16-bit binary number	Low Word Min	
1166	GRIDSCAN® Input 2, Liquid Temperature, Cfg	GRIDSCAN® Input 2 liquid temperature configuration details	16-bit binary number	0000 0000 XXXX 0YZE: Sensor Type: X = 0 Undefined = 0010 = 2 Liquid Temp Caution Set: Y = 0 Disabled = 0100 = 4 Enabled Alarm Set: Z = 0 Disabled = 0010 = 2 Enabled Enabled: E = 0 Disabled = 0001 = 1 Enabled	R
1167	GRIDSCAN® Input 2, Liquid Temperature, Caution Setpoint	Caution Setpoint Limits if enabled, 0xFFFF if not enabled x1 scale	16-bit binary number	Max	R
1168			16-bit binary number	Min	
1169	GRIDSCAN® Input 2, Liquid Temperature, Alarm Setpoint	Alarm Setpoint Limits if enabled, 0xFFFF if not enabled x1 scale	16-bit binary number	Max	R
1170			16-bit binary number	Min	

Register	Parameter	Function	Data Type	Data Range	Access
1171	GRIDSCAN® Input 2, Moisture, Cfg	GRIDSCAN® Input 2 moisture configuration details	16-bit binary number	0000 0000 XXXX 0YZE: Sensor Type: X = 0 Undefined = 0101 = 5 Moisture Caution Set: Y = 0 Disabled = 0100 = 4 Enabled Alarm Set: Z = 0 Disabled = 0010 = 2 Enabled Enabled: E = 0 Disabled = 0001 = 1 Enabled	R
1172	GRIDSCAN® Input 2, Moisture, Caution Setpoint	Caution Setpoint Limits if enabled, 0xFFFF if not enabled x10 scale	16-bit binary number	Max	R
1173			16-bit binary number	Min	
1174	GRIDSCAN® Input 2, Moisture, Alarm Setpoint	Alarm Setpoint Limits if enabled, 0xFFFF if not enabled x10 scale	16-bit binary number	Max	R
1175			16-bit binary number	Min	
1176	GRIDSCAN® Input 2, Pressure, Cfg	GRIDSCAN® Input 2 pressure configuration details	16-bit binary number	0000 0000 XXXX 0YZE: Sensor Type: X = 0 Undefined = 0110 = 6 Pressure Caution Set: Y = 0 Disabled = 0100 = 4 Enabled Alarm Set: Z = 0 Disabled = 0010 = 2 Enabled Enabled: E = 0 Disabled = 0001 = 1 Enabled	R
1177	GRIDSCAN® Input 2, Pressure, Caution Setpoint	Caution Setpoint Limits if enabled, 0xFFFF if not enabled x1000 scale	16-bit binary number	Max	R
1178			16-bit binary number	Min	
1179	GRIDSCAN® Input 2, Pressure, Alarm Setpoint	Alarm Setpoint Limits if enabled, 0xFFFF if not enabled x1000 scale	16-bit binary number	Max	R
1180			16-bit binary number	Min	