Modbus Register
1735 TRO SENSOR

V2.04

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Name	Register	Data Type	Length	Access Mode	Discrete Range	Min / Max	Description
CONTROLLER VERSION	40001	String	8	R/W			Controller version
BROMINE MEASUREMENT	40009	Float	2	R		0 /22.538	Bromine measurement
CHLORINE MEASUREMENT	40011	Float	2	R		0 /10	Chlorine measurement
TEMP C MEASUREMENT	40013	Float	2	R		0 /100	Temperature measurement in C
TEMP F MEASUREMENT	40015	Float	2	R		0 /400	Temperature measurement in F
MAIN MEAS SEC REMAINING	40017	Float	2	R		0 /9999	Number of seconds remaining for the main measurement update
BROMINE MEASUREMENT INT	40019	Unsigned Integer	1	R		0 /22538	Bromine measurement in integer and in ug/l
CHLORINE MEASUREMENT INT	40020	Unsigned Integer	1	R		0 /10000	Chlorine measurement in integer and in ug/l
SENSOR MEASUREMENT	40021	Unsigned Integer	1	R			Main measurement from sensor
TEMP MEASUREMENT	40022	Unsigned Integer	1	R		0 /100	Temperature measurement
SENSOR SECONDARY MEASUREMENT	40023	Unsigned Integer	1	R			Secondary measurement from the sensor
MEAS STAND BY DISPLAY	40024	String	1	R			Display stand by when instrument is in stand by mode
ALARM LOW CFG BROMINE	40025	Float	2	R/W		0 /22.538	Low alarm triggering point for bromine
ALARM LOW CFG CHLORINE	40027	Float	2	R/W		0 /10	Low alarm triggering point for chlorine
ALARM HIGH CFG BROMINE	40029	Float	2	R/W		0 /22.538	High alarm triggering point for bromine
ALARM HIGH CFG CHLORINE	40031	Float	2	R/W		0 /10	High alarm triggering point for chlorine
MAIN MEASUREMENT CFG	40033	Unsigned Integer	1	R/W	0 /1		Selection for the main measurement to be displayed. 0 - Bromine, 1 - Chlorine
TEMP MEASUREMENT CFG	40034	Unsigned Integer	1	R/W	0 /1		Selection for the temperature measurement to be displayed
DISPLAY FORMAT CFG	40035	Unsigned Integer	1	R/W	0 /1 /2		Display format for the main measurement
DISPLAY FORMAT VALUE	40036	Unsigned Integer	2	R		0 /4294967295	Value of the display format based on the selection
SIGNAL AVERAGING CFG	40038	Unsigned Integer	1	R/W	0 /1 /2 /3		Signal averaging. 0 - 1 point, 1 - 2 points, 2 - 3 points, 3 - 4 points.
DATA LOG SETUP	40039	Unsigned Integer	1	R/W	1 /2 /3 /5 /10		Data log interval in measurement cycles. 1, 2, 3, 5 and 10.
SENSOR NAME	40040	String	8	R			Sensor name
SENSOR SN	40048	String	6	R			Sensor S/N
SET TO DEFAULT - CONFIGURATION	40054	Unsigned Integer	1	R/W		0 /1	Set to default - Configuration. Write 1 to set to defaults.
REAGENT BALANCE HOURS	40055	Float	2	R		0 /100000	No of hours the instrument can run with the available reagent
REAGENT AVAILABLE	40057	Float	2	R		0 /250	Reagent Available in ml
REAGENT REPLACED	40059	Unsigned Integer	1	R/W		0 /1	Reagent Replaced. Write 1 to process reagent replaced
REAGENT REPLACED TIME	40060	Time2	2	R			Time when reagents were replaced

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REAGENT REPLACED DATE	40062	Time2	2	R			Time when reagents were replaced
REAGENT EST EMPTY TIME	40064	Time2	2	R			Estimated time for the reagents to go empty
REAGENT EST EMPTY DATE	40066	Time2	2	R			Estimated time for the reagents to go empty
INSTRUMENT STATUS	40068	Unsigned Integer	1	R	0 /1		Instrument status 0 = Run mode, 1 = Stand by mode
CHANGE INSTRUMENT STATUS	40069	Unsigned Integer	1	R/W		0 /1	Change instrument status. Write 1 to change the instrument status.
INSTRUMENT RESTART	40070	Unsigned Integer	1	R/W		0 /1	Instrument restart. Write 1 to restart the instrument.
COLORIMETER CLEANED	40071	Unsigned Integer	1	R/W		0 /1	Processes the colorimeter clean. Write 1 to process colorimeter clean.
REAGENT PURGE PULSES	40072	Unsigned Integer	1	R/W		1 /65535	Number of pulses to purge the reagent lines
START REAGENT PURGE	40073	Unsigned Integer	1	R/W		0 /1	Start reagent purge. Write 1 to start purging reagent.
REAGENT LOW WARNING	40074	Unsigned Integer	1	R	0 /1		Reagent low warning 0 = No warning, 1 = Warning
LOW REFERENCE WARNING	40075	Unsigned Integer	1	R	0 /1		Low reference warning 0 = No warning, 1 = Warning
MEAS HIGH WARNING	40076	Unsigned Integer	1	R	0 /1		Measurement high warning 0 = No warning, 1 = Warning
MEAS LOW WARNING	40077	Unsigned Integer	1	R	0 /1		Measurement low warning 0 = No warning, 1 = Warning
REAGENTS EMPTY ERROR	40078	Unsigned Integer	1	R	0 /1		Reagent empty error 0 = No error, 1 = Error
REFERENCE COUNT RANGE ERROR	40079	Unsigned Integer	1	R	0 /1		Reference count range error 0 = No error, 1 = Error
INTERNAL COMM ERROR	40080	Unsigned Integer	1	R	0 /1		Internal communication error 0 = No error, 1 = Error
LED FAIL HIGH REFERENCE ERROR	40081	Unsigned Integer	1	R	0 /1		LED fail high reference error 0 = No error, 1 = Error
LED FAIL LOW REFERENCE ERROR	40082	Unsigned Integer	1	R	0 /1		LED fail low reference error 0 = No error, 1 = Error
ZERO REFERENCE COUNTS HIGH ERROR	40083	Unsigned Integer	1	R	0 /1		Zero reference counts high error 0 = No error, 1 = Error
FUNCTION CODE	40084	Unsigned Integer	1	R/W		0 /65535	The function code tag
NEXT DISPLAY STATE	40085	Unsigned Integer	1	R		0 /65535	Next state for the display
ZERO CALIBRATION BROMINE	40086	Float	2	R/W		-22.5 /22.5	Zero calibration value for bromine
ZERO CALIBRATION CHLORINE	40088	Float	2	R/W		-10 /10	Zero calibration value for chlorine
STD CALIBRATION BROMINE	40090	Float	2	R/W		-5 /5	Std calibration value for bromine
STD CALIBRATION CHLORINE	40092	Float	2	R/W		-5 /5	Std calibration value for chlorine
SET TO DEFAULT - CALIBRATION	40094	Unsigned Integer	1	R/W		0 /1	Set to default - Calibration. Write 1 to set to defaults.
REAGENT CYCLE VOLUME	40095	Float	2	R/W		0 /500	Volume of the reagent per cycle in uL
SET TO DEFAULT - REAGENT DATA	40097	Unsigned Integer	1	R/W		0 /1	Set to default - Reagent Data. Write 1 to set to defaults.

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Name	Register	Data Type	Length	Access Mode	Discrete Range	Min / Max	Description
CURRENT CONS PULSE ON CURR	40098	Float	2	R		-10000 /10000	Current when pulse is in ON state in mA
CURRENT CONS PULSE OFF CURR	40100	Float	2	R		-10000 /10000	Current when pulse is in OFF state in mA
ABSORBANCE	40102	Float	2	R		-5 /5	Absorbance calculation
CAL CURVE X SQUARE CONST	40104	Float	2	R/W		-20 /20	X Square constant in calibration curve
CAL CURVE X CONSTANT	40106	Float	2	R/W		-20 /20	X constant in calibration curve
CAL CURVE OFFSET	40108	Float	2	R/W		-1.00000 /+1.00000	Offset in calibration curve
SET TO DEFAULT - CAL CURVE	40110	Unsigned Integer	1	R/W		0 /1	Set to default - Calibration Curve. Write 1 to set to defaults.
SOFTWARE VERSION	40111	Float	2	R		0 /100	Smart sensor oftware version
BOOT CODE VERSION	40113	Float	2	R		0 /100	Smart sensor boot code version
DRIVER VERSION	40115	Float	2	R		0 /100	Device driver version
AVG REAGENT HOURLY CONS	40117	Float	2	R		0 /250	Average hourly consumption of reagent in mL
CURRENT CONSUMPTION REQ CODE	40119	Unsigned Integer	1	R/W	0 /1 /2 /3 /4 /5		Current consumption request code. 0 - No Device, 1 - Valve, 2 - Pump1, 3 - Pump2, 4 - Mixer, 5 - LED
CURRENT CONS NO OF PULSES	40120	Unsigned Integer	1	R		0 /99	No of pulses remaining in current diagnostics
START CURRENT CONSUMPTION	40121	Unsigned Integer	1	R/W		0 /1	Start current consumption. Write 1 to start current consumption.
CURRENT CONS PULSE ON DURATION	40122	Unsigned Integer	1	R		0 /5000	Current diagnostics pulse on duration in ms
CURRENT CONS PULSE OFF DURATION	40123	Unsigned Integer	1	R		0 /5000	Current diagnostics pulse off duration in ms
R_SENSE	40124	Float	2	R/W		0.001 /100000	Resitor value for current consumption
MULT FACTOR	40126	Float	2	R/W		0 /10000	Multiplication factor for current consumption
OFFSET VOLTAGE	40128	Float	2	R/W		0 /12	Offset voltage for current consuption
SET TO DEFAULT - CURRENT CONS CAL	40130	Unsigned Integer	1	R/W		0 /1	Set to default - Current Consumption Cal. Write 1 to set to defaults.
REFERENCE COUNT	40131	Unsigned Integer	2	R		0 /100000	Reference count
SAMPLE COUNT	40133	Unsigned Integer	2	R		0 /100000	Sample Count
ZERO COUNT	40135	Unsigned Integer	2	R		0 /100000	Zero count
MEASUREMENT CURVE COUNT	40137	Unsigned Integer	2	R		0 /100000	Measurement curve count (Per second reading)
MEASUREMENT CURVE INDEX	40139	Unsigned Integer	1	R		0 /65535	Measurement curve index
DATA LOG SETUP	40140	Unsigned Integer	1	R/W	0 /1		Data log setup 0 - Detailed Curve Log, 1 - Cycle log
CURVE LOG TIME	40141	Unsigned Integer	1	R/W	0 /1 /2 /3 /4		Curve log recording time. 0 - 1 Sec, 1 - 2 Sec, 2 - 3 Sec, 3 - 5 Sec, 4 - 10 Sec
POWER ON REAGENT CYCLES	40142	Unsigned Integer	1	R/W		1 /65535	Power on reagent cycles
POWER ON SAMPLE FLUSH TIME	40143	Unsigned Integer	1	R/W		1 /65535	Power on sample flush time in sec
MEAS CYCLE REAGENT PUMP 1 PULSES	40144	Unsigned Integer	1	R/W		1 /65535	Measurement cycle reagent pump 1 pulses

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MEAS CYCLE REAGENT PUMP 2 PULSES	40145	Unsigned Integer	1	R/W		1 /65535	Measurement cycle reagent pump 2 pulses
PUMP ON TIME	40146	Unsigned Integer	1	R/W		0 /65535	Pump on and off time
MEAS CYCLE MIXER PULSES	40147	Unsigned Integer	1	R/W		1 /65535	Measurement cycle mixer pulses
MEAS CYCLE SAMPLE RINSE TIME	40148	Unsigned Integer	1	R/W		1 /65535	Measurement cycle sample rinse time in sec
MEAS CYCLE COLOR DEV TIME	40149	Unsigned Integer	1	R/W		0 /65535	Measurement cycle color development time in sec
MEAS CYCLE SAMPLE STABLE TIME	40150	Unsigned Integer	1	R/W		0 /65535	Measurement cycle sample stable time in sec
SET TO DEFAULT - MEAS CYCLE TIME	40151	Unsigned Integer	1	R/W		0 /1	Set to default - Measurement Cycle Time. Write 1 to set to defaults.
MEAS PARAM REF MIN	40152	Unsigned Integer	1	R/W		1 /49999	Minimum number of reference counts
MEAS PARAM REF MAX	40153	Unsigned Integer	1	R/W		1 /50000	Maximum number of reference counts
SET TO DEFAULT - MEAS PARAMETERS	40154	Unsigned Integer	1	R/W		0 /1	Set to default - Measurement Parameters. Write 1 to set to defaults.
LED DRIVE MIN VOLTAGE	40155	Float	2	R/W		0 /5.00	LED drive minimum voltage in volts
LED DRIVE MAX VOLTAGE	40157	Float	2	R/W		0 /5.00	LED drive maximum voltage in volts
SET TO DEFAULT - LED DRIVE VOLTAGE	40159	Unsigned Integer	1	R/W		0 /1	Set to default - LED Drive Voltage. Write 1 to set to defaults.
SERVICE PASSCODE	40160	Unsigned Integer	1	R/W		1 /65535	Service menu passcode
SERVICE PASSCODE ENTRY	40161	Unsigned Integer	1	R/W		0 /65535	Service menu passcode entry
SET TO DEFAULT - PASSCODE	40162	Unsigned Integer	1	R/W		0 /1	Set to default - Passcode. Write 1 to set to defaults.
INSTRUMENT SERIAL NUMBER	40163	String	6	R			Instrument serial number
EVENT LOG PARAM TEXT	40169	String	14	R			Event log parameter text
DIAG SCREEN DATA POINTS SEL	40183	Unsigned Integer	1	R/W	0 /1 /2 /3 /4 /5 /6 /7 /8 /9 /10 /11 /12 /13 /14 /15		Diagnostics screen data point select
SER DIAG SCR TXT 1	40184	String	4	R			Diagnostics screen text
SER DIAG SCR TXT 2	40188	String	4	R			Diagnostics screen text
SER DIAG SCR TXT 3	40192	String	4	R			Diagnostics screen text
SER DIAG SCR TXT 4	40196	String	4	R			Diagnostics screen text
SER DIAG SCR TXT 5	40200	String	4	R			Diagnostics screen text
SER DIAG SCR TXT 6	40204	String	4	R			Diagnostics screen text
SER DIAG SCR VAL 1	40208	Unsigned Integer	1	R		0 /0	Diagnostics screen value
SER DIAG SCR VAL 2	40209	Unsigned Integer	1	R		0 /0	Diagnostics screen value
SER DIAG SCR VAL 3	40210	Unsigned Integer	1	R		0 /0	Diagnostics screen value
SER DIAG SCR VAL 4	40211	Unsigned Integer	1	R		0 /0	Diagnostics screen value
SER DIAG SCR VAL 5	40212	Unsigned Integer	1	R		0 /0	Diagnostics screen value

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Name	Register	Data Type	Length	Access Mode	Discrete Range	Min / Max	Description
SER DIAG SCR VAL 6	40213	Unsigned Integer	1	R		0 /0	Diagnostics screen value
DUMMY TAG FOR DIAG SCREEN	40214	String	4	R			Dummy tag for diagnostics screen
PURGE MODE	40218	Unsigned Integer	1	R/W	0 /1 /2		Purging mode for the reagent lines
FUSE SAVER DELAY TIME	40219	Unsigned Integer	1	R/W		0 /65535	Fuse Saver Time in milliseconds
POSTREAGENT SAMPLE TIME	40220	Unsigned Integer	1	R/W		0 /65535	Post Reagent Sample Time in milliseconds
CAL CURVE X CUBE CONST	40221	Float	2	R/W		-20 /20	X cubed constant in calibration curve

ALL Sensors and Analyzer: Classified ERROR Word - Register 49930

Table 2 Error register

Bit	Error	Description
0	Calibration error	Faulty calibration detected
1	Electronic settings error	Faulty electronic calibration/settings
2	Cleaning error	Error in cleaning cycle detected
3	Measuring module error	Error in measuring module detected
4	System initialization	Inconsistent settings detected, reset to factory settings
5	Hardware error	Faulty hardware detected
6	Internal communication error	Internal communication error detected
7	Humidity error	Excessive humidity detected
8	Excessive temperature	Excessive temperature detected
9		
10	Sample feed warning	Error in sample feed detected
11	Questionable calibration warning	Accuracy of previous calibration inadequate
12	Questionable measurement warning	Accuracy of previous measurement inadequate/out of range
13	Safety warning	Safety equipment error detected
14	Reagent warning	Reagent warning, e.g. fill level < min detected
15	Service request warning	Service request detected

ALL Sensors and Analyzer: Classified STATUS Word - Register 49931

Table 3 Status register

Bit	Status 1	Description
0	Calibration activated	Calibration in progress, measurement value not up to date
1	Cleaning activated	Cleaning in progress, measurement value not up to date
2	Service mode activated	Device in "Service" mode, measurement value not up to date
3	General error message	General error detected, refer to error text for details
4	Measurement value channel 0, poor quality	Measurement accuracy is not within specified limits
5	Measurement value channel 0, range short-fall	Measurement value falls short of the specified range
6	Measurement value channel 0, range exceeded	Measurement value exceeds the specified range
7	Measurement value channel 1, poor quality	Measurement accuracy is not within specified limits
8	Measurement value channel 1, range short-fall	Measurement value falls short of the specified range
9	Measurement value channel 1, range exceeded	Measurement value exceeds the specified range
10	Measurement value channel 2, poor quality	Measurement accuracy is not within specified limits
11	Measurement value channel 2, range short-fall	Measurement value falls short of the specified range
12	Measurement value channel 2, range exceeded	Measurement value exceeds the specified range
13	Measurement value channel 3, poor quality	Measurement accuracy is not within specified limits
14	Measurement value channel 3, range short-fall	Measurement value falls short of the specified range
15	Measurement value channel 3, range exceeded	Measurement value exceeds the specified range