

Modbus Interfacing Guide

For EWA sensor model E1



Application Note - No. 2

For FW version 6.94 or later

MANUFACTURER EWA Sensors
Bakkeborgdalen 40, DK - 8600 Silkeborg

CONTACT Phone: +45 2568 3025
Mail: kuhne@ewasensors.com

Introduction

The EWA sensor is communication through the Modbus RS-485 RTU interface.

The sensor is a “2-wired” Modbus sensor, in accordance with EIA/TIA-485 standard.

This guide specifies all information needed, to integrate EWA sensors into existing control system.

The Modbus Interfacing Guide takes you through the following chapters:

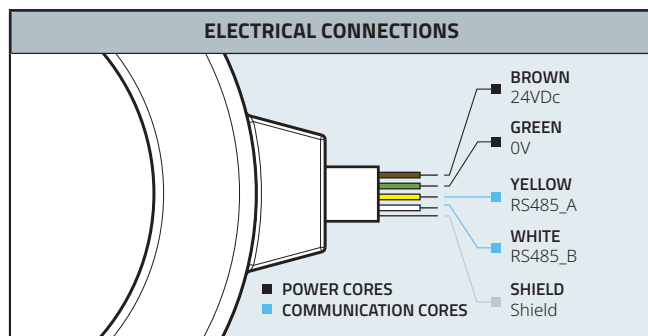
- **Electrical installation**
- **Visual diagnosis**
- **Implementation Class**
- **Modbus – Data bit sequence**
- **EWA Register Blocks**

TWO-WIRED RS485 MULTIPOINT SYSTEM	
Sensor type	RS-485 RTU
Configuration	2-wire
Sensor type	With driver and receiver circuits
Line polarization	The device has line polarization implemented
Sensor load	1/8 unit load

Electrical installation

Multiple sensors can be connected to the trunk cable, as passive TAPs (driver/receiver is in the sensor).

All EWA sensors must be interconnected with the system Master, through the same Common. The Shield must be connected directly to protective ground, preferably at one point only for the entire bus.



Visual diagnosis

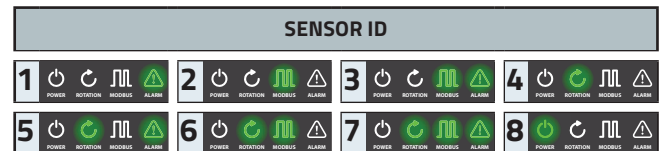
Communication and device status are indicated by LEDs. LEDs have following indication:

LED	STATE	COLOR
LED1	Switched ON when device is powered	Green
LED3	Switched ON during frame reception or frame sending	Green
	Switched ON when communication fault (Command or address fault)	Red
	Switched OFF when no communication takes place	No light

Visual diagnosis - continued

When the sensor is powered-up, the sensor LEDs will indicate the actual sensor ID no.

- The sensor is powered-on / power resetted
- The sensor LED will light-up with GREEN light, indicating the binary sensor ID number (read from right).



- This light will be on for 2 sec., the return to READY STATE, indicating LED1 as GREEN.

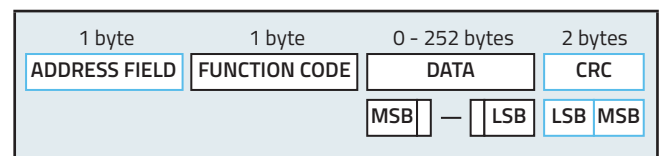


Implementation Class

Addressing	Configurable, 1 to 247
Broadcast	Yes
Baud rate	2.400, 4.800, 9.600, 19.200 (default), 38.400, 57.600, 115.200, 230.400
Parity	EVEN (default) / Odd / None
Data bits	8
Addressing type	Zero-based addressing (+1 offset used)
Endian mode	Big Endian Stores most significant byte at the lowest memory address

Data bit sequence

Each character or byte is sent in the order shown below, in order left to right. Remark that DATA send Most Significant Bytes (MSB) first, while the CRC send Least Significant Byte (LSB) first.



Modbus block request

The Modbus protocol supports both single address requests and blocktransfers.

Power Reset

Selected parameters are saved in the internal Flash Circuit and are restored after a power shutdown and after a firmware upgrade.

These parameters are marked in this Modbus Guide, with a “F”, for “Flashed saved”.

EWA Register Blocks

FEATURE	ADDRESS	REGISTER NAME	DESCRIPTION	UNIT	TYPE	PERMISSION	DEFAULT	FLASH
Communication	40 001	SlaveAddress	Sensor ID number Default setting is 1	- - -	uint16	R/W	1	F
	40 002	FWversion	Sensor firmware version	- - -	uint16	R	- - -	F
	40 003	BaudRate	Modbus transmission speed 1: 2.400 2: 4.800 3: 9.600 4: 19.200 (default) 5: 38.400 6: 57.600 7: 115.200 8: 230.400	Enum	uint16	R/W	4	F
	40 004	Parity	One-bit checksum, bit failure detection 0: None 1: Even (default) 2: Odd	Enum	uint16	R/W	1	F
	40 005	Stopbit	Number of stop bits in the Modbus frame 1: One stopbit (default) 2: Two stopbit	Enum	uint16	R/W	1	F
Operation	40 006	OperationTime	Machine operation time, for last 24 hours	Min.	uint16	R	- - -	
	40 007	OperationTime_Total	Machine operation time, since the sensor was installed	Hours	uint16	R	- - -	F
	40 008	StartStop	Number of Start/stops, for the last 24 hours	Start/stop	uint16	R	- - -	
	40 009	StartStop_Total	Number of start/stops, since the sensor was installed	Start/stop	uint16	R	- - -	
	40 010	DutyCycle	The ratio of machine run time for the last 24 hours	%	uint16	R	- - -	
Motor RPM	40 011	RPMmag_MSB	Rotation speed, from magnetic field	RPM	float32	R	- - -	
	40 012	RPMmag_LSB						
	40 013	RPMvib_MSB	Rotation speed, from vibration	RPM	float32	R	- - -	
	40 014	RPMvib_LSB						
Rotation direction	40 015	Mag_RotationDirection	Motor rotation direction: 0: Pump not running 1: Pump running clockwise (CW) 2: Pump running counter-clockwise (CCW)	Enum	uint16	R	- - -	
Motor poles	40 016	Motor_Poles	Motor pole numbers: 2: 2 pole motor 4: 4 pole motor 6: 6 pole motor	Poles	uint16	R/W	- - -	F
Motor Slip speed	40 017	SlipSpeed_MSB	Difference in magnetic and vibration rotation speed	RPM	float32	R	- - -	
	40 018	SlipSpeed_LSB						
Machine orientation	40 019	HorizontalVertical	Machine orientation, vertical or horizontal: 1: Horizontal machine 2: Vertical Machine	Enum	uint16	R/W	- - -	F

EWA Register Blocks - continued

FEATURE	ADDRESS	REGISTER NAME	DESCRIPTION	UNIT	TYPE	PERMISSION	DEFAULT	FLASH
Health	40 020	MachineHealth	0: Baseline initialization 1: Normal 2: Warning 3: Alarm	Enum	uint16	R	- - -	
False Brinelling	40 021	FalseBrinelling_Ratio_MSB	The amount of background vibration on engine not running, in relation to total vibration impact. Secondary Impact causes e.g. false brinelling.	%	float32	R	- - -	
	40 022	FalseBrinelling_Ratio_LSB						
Magnetic strength	40 023	MagneticStrength_MSB	Magnetic field strength	μ T RMS	float32	R	- - -	
	40 024	MagneticStrength_LSB						
Warning register	40 025	WarningRegister	Warning register flags: 0: Warning, Unbalance 1: Warning, Cavitation 2: Warning, Overall Vibration RMS, X-dimension 3: Warning, Overall Vibration RMS, Y-dimension 4: Warning, Overall Vibration RMS, Z-dimension 5: Warning, temperature 6: Warning, planetary gear 7: Warning, bearing fault	Bit-map	uint16	R		
Alarm register	40 026	AlarmRegister	Alarm register flags: 0: Alarm, Unbalance 1: Alarm, Cavitation 2: Alarm, Overall Vibration RMS, X-dimension 3: Alarm, Overall Vibration RMS, Y-dimension 4: Alarm, Overall Vibration RMS, Z-dimension 5: Alarm, temperature 6: Alarm, planetary gear 7: Alarm, bearing fault	Bit-map	uint16	- - -		
Machine operation settings	40 027	Shift_Rotation_Direction_Convention	Shift of rotation direction convention: 0: Normal 1: Reverse	Enum	uint16	R/W	0	F
	40 028	Maximum Line Frequency	Max. setting, for RPM Magnetic algorithm	Hz	uint16	R/W	62	F
	40 029	Measured Line Frequency	Actual measured line frequency	Hz	float32	R	- - -	
	40 030							
	40 031	Device operation time	Total time since the sensor was installed	Days	uint16	R	- - -	
	40 032	Forced Device Reset	Sensor starts recalculating all baselines: 0: No forced reset 1: Forced reset	Enum	uint16	W	- - -	
	40 033	LED Demo Mode	0: Normal 1: "All green" demo 2: "Red Alarm" demo 3: "Reverse rotation" demo	Enum	uint16	R/W	0	

EWA Register Blocks - continued

FEATURE	ADDRESS	REGISTER NAME	DESCRIPTION	UNIT	TYPE	PERMISSION	DEFAULT	FLASH
Ma- chine oper- ation set- tings <i>contin- ued</i>	40 034	LED_Status	LED light command: 0: No light 1: Green 2: Red Example: Command: 1010 LEDs: Green / no light / Green / no light	---	uint16	R		
	40 035	Reset_Hardware	Power cycling of sensor 1: Reset hardware	---	uint16	W		
Not in use	40 036							
Bearing	40 037	BearingType_DE	Drive End bearing type	---	uint16	R/W	---	F
	40 038	BearingType_NDE	Non-Drive End bearing type	---	uint16	R/W	---	F
	40 039	BearingXfactor_MSB	Bearing Xfactor value	---	Float32	R	---	
	40 040	BearingXfactor_LSB						
Vibra- tion RMS X- direc- tion	40 041	RMSVibLevel_X_MSB	Overall vibration RMS, X-direction	mm/s RMS	float32	R	---	
	40 042	RMSVibLevel_X_LSB						
	40 043	RMSVibLevel_X_Baseline_MSB	Baseline, overall vibration RMS in X-direction	mm/s RMS	float32	R/W	---	F
	40 044	RMSVibLevel_X_Baseline_LSB						
	40 045	RMSVibLevel_X_Dynamic_Warning_Gain_MSB	Dynamic warning gain, overall vibration RMS in X-direction	---	float32	R/W	2.0	F
	40 046	RMSVibLevel_X_Dynamic_Warning_Gain_LSB						
	40 047	RMSVibLevel_X_Dynamic_Alarm_Gain_MSB	Dynamic alarm gain, overall vibration RMS in X-direction	---	float32	R/W	3.0	F
	40 048	RMSVibLevel_X_Dynamic_Alarm_Gain_LSB						
	40 049	RMSVibLevel_X_Static_Alarm_Level_MSB	Static alarm level, absolute overall vibration RMS in X-direction	mm/s RMS	float32	R/W	0	F
	40 050	RMSVibLevel_X_Static_Alarm_Level_LSB						
	40 051	RMSVibLevel_X_Health_Status	Health Status: 0: Baseline initialization 1: Normal 2: Warning 3: Alarm	Enum	uint16	R	---	
	40 052	RMSVibLevel_X_Health_Active	Connect feature to Machine Health Indicator: 0: No connection 1: Connected	Enum	uint16	R/W	1.0	F
Vibra- tion RMS Y- direc- tion	40 053	RMSVibLevel_Y_MSB	Overall vibration RMS, Y-direction (mm/s RMS)	mm/s RMS	float32	R	---	
	40 054	RMSVibLevel_Y_LSB						
	40 055	RMSVibLevel_Y_Baseline_MSB	Baseline, overall vibration RMS in Y-direction	mm/s RMS	float32	R/W	---	F
	40 056	RMSVibLevel_Y_Baseline_LSB						
	40 057	RMSVibLevel_Y_Dynamic_Warning_Gain_MSB	Dynamic warning gain, overall vibration RMS in Y-direction	---	float32	R/W	2.0	F
	40 058	RMSVibLevel_Y_Dynamic_Warning_Gain_LSB						
	40 059	RMSVibLevel_Y_Dynamic_Alarm_Gain_MSB	Dynamic alarm gain, overall vibration RMS in Y-direction	---	float32	R/W	3.0	F
	40 060	RMSVibLevel_Y_Dynamic_Alarm_Gain_LSB						
	40 061	RMSVibLevel_Y_Static_Alarm_Level_MSB	Static alarm level, absolute overall vibration RMS in Y-direction	mm/s RMS	float32	R/W	0	F
	40 062	RMSVibLevel_Y_Static_Alarm_Level_LSB						

EWA Register Blocks - continued

FEATURE	ADDRESS	REGISTER NAME	DESCRIPTION	UNIT	TYPE	PERMISSION	DEFAULT	FLASH
Vibration RMS Y-direction <i>continued</i>	40 063	RMSVibLevel_Y_Health_Status	Health Status: 0: Baseline initialization 1: Normal 2: Warning 3: Alarm	Enum	uint16	R	---	
	40 064	RMSVibLevel_Y_Health_Active	Connect feature to Machine Health Indicator: 0: No connection 1: Connected	Enum	uint16	R/W	1.0	F
Vibration RMS Z-direction	40 065	RMSVibLevel_Z_MSB	Overall vibration RMS, Z-direction	mm/s RMS	float32	R	---	
	40 066	RMSVibLevel_Z_LSB						
	40 067	RMSVibLevel_Z_Baseline_MSB	Baseline, overall vibration RMS in Z-direction	mm/s RMS	float32	R/W	---	F
	40 068	RMSVibLevel_Z_Baseline_LSB						
	40 069	RMSVibLevel_Z_Dynamic_Warning_Gain_MSB	Dynamic warning gain, overall vibration RMS in Z-direction	---	float32	R/W	2.0	F
	40 070	RMSVibLevel_Z_Dynamic_Warning_Gain_LSB						
	40 071	RMSVibLevel_Z_Dynamic_Alarm_Gain_MSB	Dynamic alarm gain, overall vibration RMS in Z-direction	---	float32	R/W	3.0	F
	40 072	RMSVibLevel_Z_Dynamic_Alarm_Gain_LSB						
	40 073	RMSVibLevel_Z_Static_Alarm_Level_MSB	Static alarm level, absolute overall vibration RMS in Z-direction	mm/s RMS	float32	R/W	0	F
	40 074	RMSVibLevel_Z_Static_Alarm_Level_LSB						
	40 075	RMSVibLevel_Z_Health_Status	Health Status: 0: Baseline initialization 1: Normal 2: Warning 3: Alarm	Enum	uint16	R	---	
	40 076	RMSVibLevel_Z_Health_Active	Connect feature to Machine Health Indicator: 0: No connection 1: Connected	Enum	uint16	R/W	1.0	F
Unbalance	40 077	Unbalance_MSB	Unbalance	mm/s RMS	float32	R	---	
	40 078	Unbalance_LSB						
	40 079	Unbalance_Baseline_MSB	Baseline, unbalance	mm/s RMS	float32	R/W	---	F
	40 080	Unbalance_Baseline_LSB						
	40 081	Unbalance_Dynamic_Warning_Gain_MSB	Dynamic alarm gain, unbalance	---	float32	R/W	2.0	F
	40 082	Unbalance_Dynamic_Warning_Gain_LSB						
	40 083	Unbalance_Dynamic_Alarm_Gain_MSB	Gain for alarm, unbalance	---	float32	R/W	3.0	F
	40 084	Unbalance_Dynamic_Alarm_Gain_LSB						
	40 085	Unbalance_Static_Alarm_Level_MSB	Static alarm level, absolute unbalance	mm/s RMS	float32	R/W	0	F
	40 086	Unbalance_Static_Alarm_Level_LSB						
	40 087	Unbalance_Health_Status	Health Status: 0: Baseline initialization 1: Normal 2: Warning 3: Alarm	Enum	uint16	R	---	
	40 088	Unbalance_Health_Active	Connect feature to Machine Health Indicator: 0: No connection 1: Connected	Enum	uint16	R/W	1.0	F

EWA Register Blocks - continued

FEATURE	ADDRESS	REGISTER NAME	DESCRIPTION	UNIT	TYPE	PERMISSION	DEFAULT	FLASH
Cavitation	40 089	Cavitation_MSB	Cavitation, normalized	---	float32	R	---	
	40 090	Cavitation_LSB						
	40 091	Cavitation_Baseline_MSB	Baseline, cavitation	---	float32	R/W	---	F
	40 092	Cavitation_Baseline_LSB						
	40 093	Cavitation_Dynamic_Warning_Gain_MSB	Dynamic warning gain, cavitation	---	float32	R/W	2.0	F
	40 094	Cavitation_Dynamic_Warning_Gain_LSB						
	40 095	Cavitation_Dynamic_Alarm_Gain_MSB	Dynamic alarm gain, cavitation	---	float32	R/W	3.0	F
	40 096	Cavitation_Dynamic_Alarm_Gain_LSB						
	40 097	Cavitation_Static_Alarm_Level_MSB	Static alarm level, absolute cavitation	---	float32	R/W	0	F
	40 098	Cavitation_Static_Alarm_Level_LSB						
	40 099	Cavitation_Health_Status	Health Status: 0: Baseline initialization 1: Normal 2: Warning 3: Alarm	Enum	uint16	R	---	
Temperature	40 100	Cavitation_Health_Active	Connect feature to Machine Health Indicator: 0: No connection 1: Connected	Enum	uint16	R/W	1.0	F
	40 101	Temperature_MSB	Temperature	°C	float32	R	---	
	40 102	Temperature_LSB						
	40 103	Temperature_Baseline_MSB	Baseline, temperature	°C	float32	R/W	---	F
	40 104	Temperature_Baseline_LSB						
	40 105	Temperature_Dynamic_Warning_Gain_MSB	Dynamic warning gain, temperature	---	float32	R/W	2.0	F
	40 106	Temperature_Dynamic_Warning_Gain_LSB						
	40 107	Temperature_Dynamic_Alarm_Gain_MSB	Dynamic alarm gain, temperature	---	float32	R/W	3.0	F
	40 108	Temperature_Dynamic_Alarm_Gain_LSB						
	40 109	Temperature_Static_Alarm_Level_MSB	Static alarm level, absolute temperature	°C	float32	R/W	0	F
	40 110	Temperature_Static_Alarm_Level_LSB						
	40 111	Temperature_Health_Status	Health Status: 0: Baseline initialization 1: Normal 2: Warning 3: Alarm	Enum	uint16	R	---	
Gear Mesh	40 112	Temperature_Health_Active	Connect feature to Machine Health Indicator: 0: No connection 1: Connected	Enum	uint16	R/W	1.0	F
	40 113	GearMesh_MSB	Gear Mesh	mm/s RMS	float32	R	---	
	40 114	GearMesh_LSB						
	40 115	GearMesh_Baseline_MSB	Baseline, Gear Mesh	mm/s RMS	float32	R/W	---	F
	40 116	GearMesh_Baseline_LSB						
	40 117	GearMesh_Dynamic_Warning_Gain_MSB	Dynamic warning gain, Gear Mesh	---	float32	R/W	2.0	F
	40 118	GearMesh_Dynamic_Warning_Gain_LSB						
	40 119	GearMesh_Dynamic_Alarm_Gain_MSB	Dynamic alarm gain, Gear Mesh	---	float32	R/W	3.0	F
	40 120	GearMesh_Dynamic_Alarm_Gain_LSB						

EWA Register Blocks - continued

FEATURE	ADDRESS	REGISTER NAME	DESCRIPTION	UNIT	TYPE	PERMISSION	DEFAULT	FLASH
Gear Mesh <i>continued</i>	40 121	GearMesh_Static_Alarm_Level_MSB	Static alarm level, absolute Gear Mesh	mm/s RMS	float32	R/W	0	F
	40 122	GearMesh_Static_Alarm_Level_LSB						
	40 123	GearMesh_Health_Status	Health Status: 0: Baseline initialization 1: Normal 2: Warning 3: Alarm	Enum	uint16	R	---	
	40 124	GearMesh_Health_Active	Connect feature to Machine Health Indicator: 0: No connection 1: Connected	Enum	uint16	R/W	0	F
Bearing Fault	40 125	BearingFault_MSB	Bearing fault, normalized	---	float32	R	---	
	40 126	BearingFault_LSB						
	40 127	BearingFault_Baseline_MSB	Baseline, bearing fault	---	float32	R/W	---	F
	40 128	BearingFault_Baseline_LSB						
	40 129	BearingFault_Dynamic_Warning_Gain_MSB	Dynamic warning gain, bearing fault	---	float32	R/W	2.0	F
	40 130	BearingFault_Dynamic_Warning_Gain_LSB						
	40 131	BearingFault_Dynamic_Alarm_Gain_MSB	Dynamic alarm gain, bearing fault	---	float32	R/W	3.0	F
	40 132	BearingFault_Dynamic_Alarm_Gain_LSB						
	40 133	BearingFault_Static_Alarm_Level_MSB	Static alarm level, absolute bearing fault	---	float32	R/W	0	F
	40 134	BearingFault_Static_Alarm_Level_LSB						
	40 135	BearingFault_Health_Status	Health Status: 0: Baseline initialization 1: Normal 2: Warning 3: Alarm	Enum	uint16	R	---	
Vibration RMS Total	40 147	Vibration_RMS_Total_ModbusAddress_MSB	Vibration level RMS total (the square root of the mean of the squares of the instantaneous values x,y, z)	mm/s RMS	float32	R	---	
	40 148	Vibration_RMS_Total_ModbusAddress_LSB						
"Black-Box" Gear-box	40 181	GearBox_GearRatio_MSB	Gear ratio, for a "black box" gearbox (e.g. 4.28)	---	float32	R/W	0	F
	40 182	GearBox_GearRatio_LSB						
	40 183	GearBox_RPM_A_MSB	Rotation speed on shaft A	RPM	float32	R	---	
	40 184	GearBox_RPM_A_LSB						
	40 185	GearBox_RPM_B_MSB	Rotation speed on shaft B	RPM	float32	R	---	
	40 186	GearBox_RPM_B_LSB						
	40 187	GearBox_Level_1X_MSB	Vibration level, for 1X frequency	mm/s RMS	float32	R	---	
	40 188	GearBox_Level_1X_LSB						
	40 189	GearBox_Level_3X_MSB	Vibration level, for 3X frequency	mm/s RMS	float32	R	---	
	40 190	GearBox_Level_3X_LSB						
	40 191	GearBox_Fqmf_MSB	Gear Mesh frequency	Hz	float32	R	---	
	40 192	GearBox_Fqmf_LSB						
	40 181	GearBox_Lqmf_MSB	Gear Mesh frequency Vibration Level	mm/s RMS	float32	R	---	
	40 182	GearBox_Lqmf_LSB						

EWA Register Blocks - continued

FEATURE	ADDRESS	REGISTER NAME	DESCRIPTION	UNIT	TYPE	PERMISSION	DEFAULT	FLASH
Spur Gear	40 201	SpurGear_GearRatio_MSB	Gear ratio, for spur gear (e.g. 7.1)	---	float32	R/W	0	F
	40 202	SpurGear_Pinion_size_LSB						
	40 203	SpurGear_Teeth_GearA	Number of teeth, gear A (e.g. 5)	---	uint16	R/W	0	F
	40 204	SpurGear_Teeth_GearB	Number of teeth, gear B (e.g. 9)	---	uint16	R/W	0	
Not in use	40 205 to 40 220							
Machine Loose-ness (beta release)	40 221	Mechanical_Looseness_MSB	Mechanical looseness, normalized	---	float32	R	---	
	40 222	Mechanical_Looseness_LSB						
Auto rotation (beta release)	40 223	AutoRotation	Machine rotation, passive driven: 0: No auto rotation 1: Auto rotation	Enum	uint16	R	---	
Initial Base-lines	40 225	Vibration_X_Baseline_Initial_MSB	Initial baseline, for Vibration X RMS	mm/s RMS	float32	R	---	F
	40 226	Vibration_X_Baseline_Initial_LSB						
	40 227	Vibration_Y_Baseline_Initial_MSB	Initial baseline, for Vibration Y RMS	mm/s RMS	float32	R	---	F
	40 228	Vibration_Y_Baseline_Initial_LSB						
	40 229	Vibration_Z_Baseline_Initial_MSB	Initial baseline, for Vibration Z RMS	mm/s RMS	float32	R	---	F
	40 230	Vibration_Z_Baseline_Initial_LSB						
	40 231	Unbalance_Baseline_Initial_MSB	Initial baseline, for Unbalance	mm/s RMS	float32	R	---	F
	40 232	Unbalance_Baseline_Initial_LSB						
	40 233	Cavitation_Baseline_Initial_MSB	Initial baseline, for Cavitation	---	float32	R	---	F
	40 234	Cavitation_Baseline_Initial_LSB						
	40 235	Temperature_Baseline_Initial_MSB	Initial baseline, for temperature	°C	float32	R	---	F
	40 236	Temperature_Baseline_Initial_LSB						
	40 237	Gear_Baseline_Initial_MSB	Initial baseline, for gear	mm/s RMS	float32	R	---	F
	40 238	Gear_Baseline_Initial_LSB						
	40 239	BearingFault_Baseline_Initial_MSB	Initial baseline, for bearing fault	---	float32	R	---	F
	40 240	BearingFault_Baseline_Initial_LSB						
Raw Data	41 030	Raw_Data_Index_waveform	Index parameter, for raw data	---	uint16	R	---	
	41 031	Raw_Data_Vibration_waveform_MSB	Vibration raw data	mm/s ² RMS	float32	R	---	
	41 032	Raw_Data_Vibration_waveform_LSB						
	41 033	Raw_Data_Magnetic_waveform_MSB	Magnetic Field raw data	μT RMS	float32	R	---	
	41 034	Raw_Data_Magnetic_waveform_LSB						

EWA Register Blocks - continued

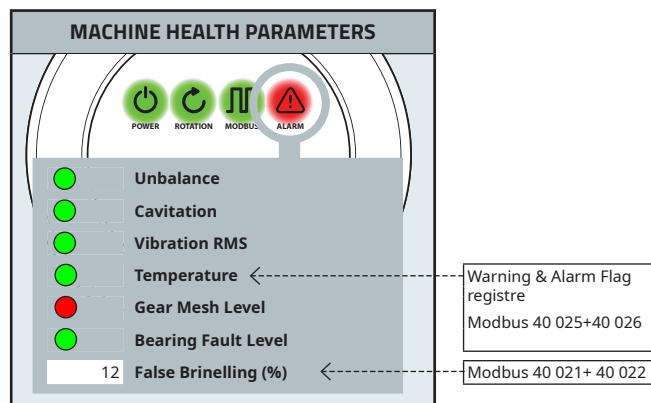
FEATURE	ADDRESS	REGISTER NAME	DESCRIPTION	UNIT	TYPE	PERMISSION	DEFAULT	FLASH
Planetary Gear	41 044	PlanetaryGear_GearRatio_MSB	Gear ratio, for planetary gear (e.g. 4.28)	---	float32	R/W	0	F
	41 045	PlanetaryGear_GearRatio_LSB						
	41 046	PlanetaryGear_Teeth_Sun	Number of teeth, Sun Gear (e.g. 9)	---	uint16	R/W	0	F
	41 047	PlanetaryGear_Teeth_Planet	Number of teeth, Planet Gear (e.g. 21)	---	uint16	R/W	0	F
	41 048	PlanetaryGear_Teeth_Ring	Number of teeth, Ring Gear (e.g. 68)	---	uint16	R/W	0	F
Standard Deviation	41 077	Vibration_X_STD_MSB	Statistical standard deviation, for vibration X	g	float32	R	---	
	41 078	Vibration_X_STD_LSB						
	41 079	Vibration_Y_STD_MSB	Statistical standard deviation, for vibration Y	g	float32	R	---	
	41 080	Vibration_Y_STD_LSB						
	41 081	Vibration_Z_STD_MSB	Statistical standard deviation, for vibration Z	g	float32	R	---	
	41 082	Vibration_Z_STD_LSB						
Kurtosis	41 083	Kurtosis_MSB	Kurtosis for raw vibration data	g	float32	R	---	
	41 084	Kurtosis_LSB						
Skewness	41 085	Skewness_MSB	Skewness for raw vibration data	g	float32	R	---	
	41 086	Skewness_LSB						
Crest Factor	41 087	CrestFactor_MSB	Crest Factor for raw vibration data	g	float32	R	---	
	41 088	CrestFactor_LSB						
Boot load	42 021	Boot_BaudRate	Baud rate, for bootloading	Enum	float32	R/W	8	F
	42 022	Boot_Parity	One-bit checksum for bit failure detection, in bootloading mode. 0: None 1: Even (default) 2: Odd	Enum	uint16	R/W	1	F
	42 023	Boot_Stopbit	Number of stop bits in the Modbus frame, in bootloading mode. 1: One stopbit (default) 2: Two stopbit	Enum	uint16	R/W	1	F

Three groups of overview parameters

Operation Parameters give a fast overview of the actual machine operation, in real-time. This is the mechanical and magnetic rotation speed, rotation direction and the slip speed. And it is operation data for the last 24 hours of machine operation (e.g. duty cycle and operation time) and the machines total operation time, since the sensor was installed.

Machine Parameters are parameters to be filled in. If the machine has a gear, spur or planetary, the gear ratio and the teeth numbers for each gear must be stated.

Machine Health Indicator give the health status of the actual machine. If a parameter is green, there is not problem with this parameter. If a parameter is indicated with yellow, it has a warning. If a parameter is indicated with red, it has an alarm.



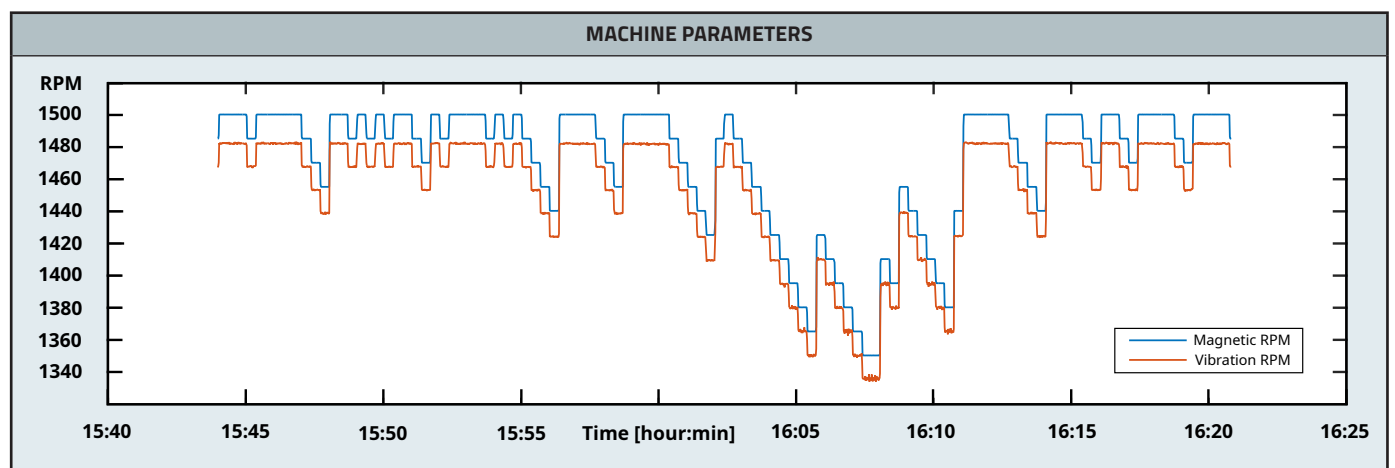
OPERATION PARAMETERS		
1500	Magnetic RPM	Modbus 40 011+ 40 012
1482	Vibration RPM	Modbus 40 013+ 40 014
18	Slip Speed	Modbus 40 017+ 40 018
CW	Rotation Direction	Modbus 40 015
4	Motor Poles	Modbus 40 016
H	Machine Orientation	Modbus 40 019
4.5	Operation the last 24 hours	Modbus 40 006
245	Total Operation Time	Modbus 40 007
11	Start/Stop the last 24 hours	Modbus 40 008
1234	Total Start/Stop	Modbus 40 009
12	Duty Cycle	Modbus 40 010

MACHINE PARAMETERS		
3.55	Spur Gear Ratio	Modbus 40 201+ 40 202
5	Number of teeth, gear A	Modbus 40 203
9	Number of teeth, gear B	Modbus 40 204
4.28	Planetary Gear Ratio	Modbus 41 044 - 41 045
9	Number of teeth, Sun	Modbus 41 046
21	Number of teeth, Planet	Modbus 41 047
68	Number of teeth, Ring	Modbus 41 048

Electric and mechanic rotation speed

The driving power (called Magnetic RPM), is indicated by the blue curve. This is the input signal to the motor, given from e.g. the variable frequency drive.

The mechanic rotation speed is indicated by the orange curve, and it is the actual speed of the rotor.



Baseline, warning and alarm levels

The blue curve shows an example of a monitored parameter curve. A dynamic baseline is calculated. First time the machine is running after sensor installation, it will use up to 12 hours to generate it's baseline.

A dynamic warning level is generated as a fixed factor multiplied by the baseline. As default this is two times the baseline, but customer can adjust this factor.

A dynamic alarm level is generated as a fixed factor multiplied by the baseline. As default this is three times the baseline, but customer can adjust this factor.

A static alarm level is a fixed level, generated by multiplying the initial baseline with a factor 4. The static alarm level is adjustable.

Finally, there is a Machine Health switch, to determine whether this parameter is included in the overall machine health assessment or not.

