

RV300

System Description

Equinox Technology AB
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1 Overview

2 Functions

3 System Hardware

3.1 Schematic Components

The system consists of electric motor, pulse generator, control panel, microcontroller, web server and backup web server.

4 System Software

4.1 Cycle

The automatic program is designed to identify the resonance frequency, run on an adjustable schedule and make relevant data available for the microcontroller.

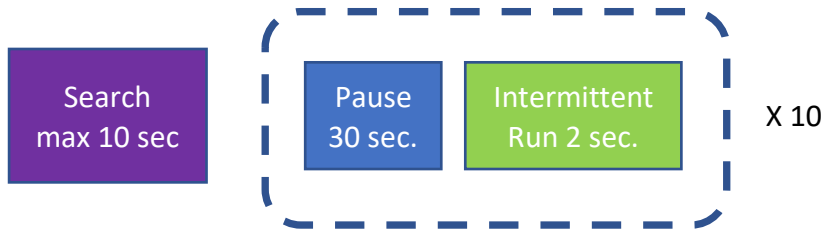


Figure 1 Schematic description of the cycle with the SYPA parameters set accordingly. From left to right, then it starts over with a pause in between.

4.2 Algorithm Parameters

The algorithm has two timers; timer and runtime:

- Timer keeps track on the sampling, the parameters DELAY and SAMPLES can also be adjusted in RV300 Controller application.
- Runtime keeps track on the maximum, or defined, time for each phase. The parameters MAX_RUNTIME_SEARCH, MAX_RUNTIME_PAUSE and MAX_RUNTIME_RUN can also be adjusted in RV300 Controller application.

4.3 Search Phase

There are four defined points in time in each search phase; PRESSURE_SPIKE_DELAY, DELAY, SAMPLES and MAX_RUNTIME_SEARCH.

Defined Point	Description
PRESSURE_SPIKE_DELAY Default: 1000 (ms)	The time will be a part of MAX_RUNTIME_SEARCH where the system only keeps motor running, compressed air flowing and monitoring the maximum torque. This is to avoid the initial pressure spike that is present when the compressed air relay is opened. NOTE: PRESSURE_SPIKE_DELAY << MAX_RUNTIME_SEARCH
DELAY Default: 300 (ms)	The delay after a new rpm is set on motor before the pressure is relevant and measured, this is to let the new conditions stabilize in the pipe. DELAY is separated from PRESSURE_SPIKE_DELAY and counts from the end of that phase on the initial part of the search phase.
SAMPLES Default: 600 (ms)	The difference between SAMPLES and DELAY is the actual sampling time. At SAMPLES the sampling ends and a decision is made if the maximum pressure is found and maximum is confirmed or if the rpm should continue to increase.
MAX_RUNTIME_SEARCH Default: 10 (s)	This is the maximum allowed time for the search phase, includes PRESSURE_SPIKE_DELAY.

4.4 Communication Flag

The motor indicates that SUPA is available for upload or that the software is ready to update SYPA via REG_APPL_DATA6 (625). Each time the microcontroller has completed the data transfer with the motor the REG_APPL_DATA6 is set to zero.

REG_APPL_DATA6	Description
0	No data available OR transfer to microcontroller completed
1	Search successfully completed
2	Pause completed
3	Intermittent run completed
4	Unsuccessful Search

Table 1 Communication flag in REG_APPL_DATA6 is indicating the content of the data.

4.5 Set SYPA (System Parameters)

After each successful or unsuccessful search the REG_APPL_DATA6 flag will indicate to the microcontroller that a pause is about to begin and that the system is ready for an update, if available at the backup web server, of SYPA.

The SYPA is stored by the user on the backup server in *sypa.conf* file, it is a comma separated file (csv) that will be deleted when the microcontroller has downloaded the content to avoid multiple downloads.

The structure of the file is as the following example where the INIT_MOTOR_SPEED is set to 2500 and the NBR_OF_RUNS is set to 15.

640, 2500,1100,15

NOTE: The process is valid for any register and not only for SYPA. This can harm the system if unwanted figures are sent to the motor.

4.6 Upload SUPA (Standard Upload Parameters)

After each phase is completed the motor will indicate to the microcontroller that standard data is available by setting REG_APPL_DATA6 according to Table 1. When the data transfer between the motor and the microcontroller is ready the microcontroller sets REG_APPL_DATA6 to zero.

4.7 Upload SUPR (Special Upload Request)

Special Upload Request

5 Interface Description

5.1 Electric Connection

The electric motor is communicating via RS-485 Modbus protocol to the microcontroller and via I/O to the control panel.

Pin Connection

Pin	Name	SH100B	SH200B
1	IN1/OUT1	Digital/Analog input and/or output (open collector type, max 30V/1A)	
2	IN2/OUT2	Digital/Analog input and/or output (open collector type, max 30V/1A)	
3	IN3/OUT3	Digital/Analog input and/or output (open collector type, max 30V/1A)	
4	IN4/OUT4	Digital/Analog input and/or output (open collector type, max 30V/1A)	
5	IN5/ENCA	Digital input or Encoder input/output (0...+5V)	
6	IN6/ENCB	Digital input or Encoder input/output (0...+5V)	
7	IN7	Digital input (0...+5V)	
	RS485A	RS485 Modbus signal A (-7...+12 V)	
	RS232 TTL	RX (0...+5V)	
	CAN L	CAN L	
8	IN8	Digital input (0...+5V)	
	RS485B	RS485 Modbus signal B (-7...+12 V)	
	RS232 TTL	TX (0...+5V)	
	CAN H	CAN H	
9	GND	Ground reference for all input/outputs	
10	+5V	+5V supply voltage output, max 100mA.(Not intended as voltage input).	
11	GND	Power supply ground	
12	+48V	Power supply input +24V	Power supply input +48V

I/O Specification

1	IN1/OUT1	Potentiometer for Manual Control
2	IN2/OUT2	Pressure Sensor
3	IN3/OUT3	Relay Compressed Air
4	IN4/OUT4	Normal/Backup Control
5	IN5/OUT5	Program Reset Switch
6	IN6/OUT6	Program Selection Switch

5.2 Motor Control System

The motor control system is integrated in the motor, it is designed to communicate specific program parameters via Modbus and registers. The System Parameters (SYPA) used to set the characteristics of the system are mapped to the following registers and are accessible to remote control.

SYPA – System Parameters

640	INIT_MOTOR_SPEED	
641	DELAY	
642	SAMPLES	
643	INITIAL_TARGET_INC	
644	RED_TARGET_INC	
645	MIN_ACC_MAX_PRESSURE	
646	MAX_PRESSURE_DROP_LEVEL	
647	FINE_TUNE_PRESSURE_LEVEL	
1100	NBR_OF_RUNS	
1101	MAX_RUNTIME_SEARCH	
1102	MAX_RUNTIME_PAUSE	
1103	MAX_RUNTIME_RUN	
	PRESSURE_SPIKE_DELAY	

The Standard Upload Parameters (SUPA) are on a regular basis uploaded via the microcontroller.

SUPA – Standard Upload Parameters

1000	Target	
1001	Pressure	
1002	Runtime	
1003	Torque	
625	Type	

6 Web Servers

6.1 Main Server

6.2 Backup Server

