Rexroth
Bosch Group

Application Software Fan Control AFC20

RE 95360/06.08 1/8
Replaces: 07.05

Data Sheet

Electronic fan control for hydrostatic fan drives, Version 20

Table of Contents

Features

- The AFC electronic fan control is an easily adjustable software package for control of hydrostatic fan drives.
- The electronic control can control up to two fan drives with setpoint specification.
- Status-dependent fan control via digital inputs
- CAN bus communication is supported.
- Improved control quality reduces energy consumption, noise emission, fuel consumption and exhaust values compared with conventional solutions.
- Parameterizable change of direction for fan self cleaning.
- The AFC20 fan control is configured for up to two A10VO variable pumps with ED electrohydraulic pressure control and an AZM fixed motor.
  A fixed pump with a fixed motor is also possible.
- Diagnostics and parameter settings are performed with the BODAS-service PC software.
- The outputs are monitored for wire breakage and short circuits.

Ordering Code

AS/	AFC	20

Type

Application Software	AS/

Software

Fan Control	AFC

Version

	20

Order Information

The AFC20 application software must only be used with the RC2-2/21 control unit and other add-on components (see page 6). When placing an order, the hardware and software ordering codes should be linked by a "+".

Example: RC2-2/21+AS/AFC20

Method of Operation

The electronic fan control is designed for controlling the following components in the open hydraulic circuit:

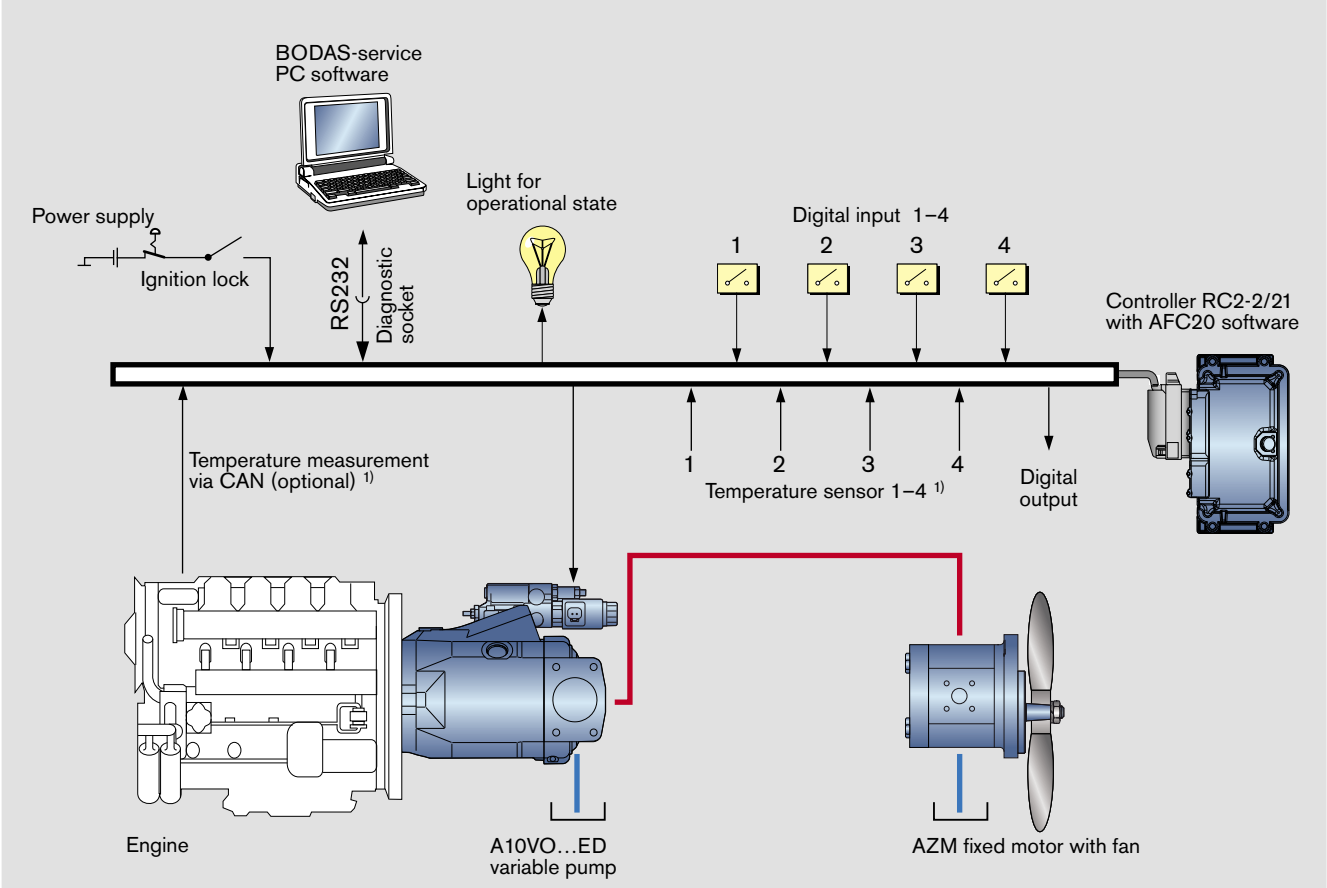
– Up to two variable pumps with electrohydraulic pressure control

– Up to two pressure-relief valves

The hydraulic concepts described below may be used for control purposes.

Hydraulic concept A

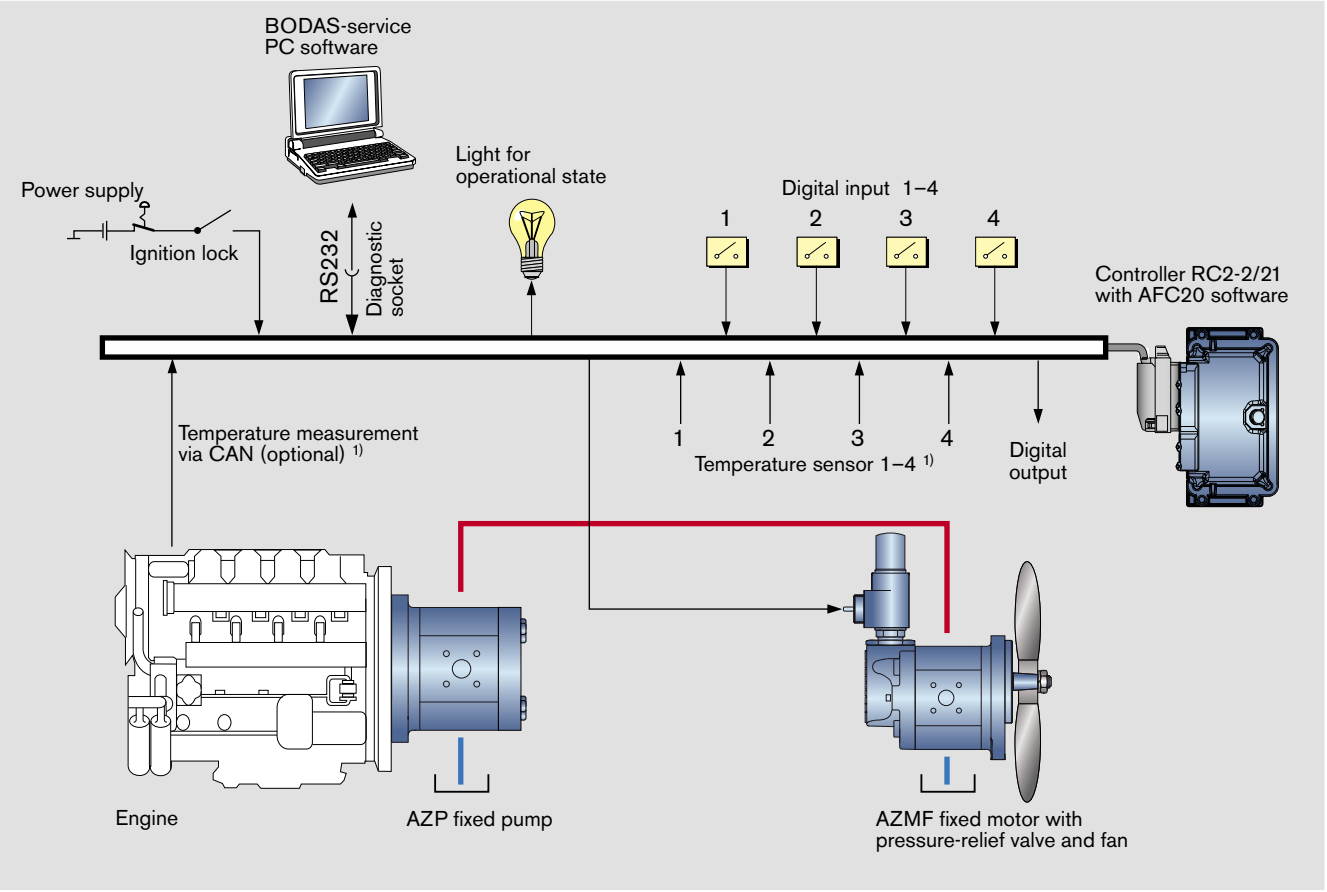
- One or two A10VO variable pumps with ED electrohydraulic pressure control, each in conjunction with an AZM fixed motor with fan (see illustration below).



1) Up to four temperature variables can be assigned either CAN or sensor values.

Hydraulic concept B

- One or two AZP fixed pumps, each in conjunction with an AZMF fixed motor with pressure-relief valve and fan (see illustration below).



1) Up to four temperature variables can be assigned either CAN or sensor values.

Function

The fan control controls up to two fans independently of each other. For each fan, four temperature inputs and four digital inputs are monitored separately.

The illustrations on pages 2 and 3 show the control system for one fan with four sensors and four digital inputs. The instructions for a single fan are described below. The second fan operates in the same way.

Setpoint Specification

The fan control calculates the setpoint power of the fan by reading in the temperature and the fan speed via sensor or CAN signals.

For the sensors, you can set parameters for the temperatures at which the different fan power levels are required. This results in a setpoint specification for each temperature input:

- If a measured value falls below the associated **lower** temperature threshold, the setpoint specification is set to 0.
- If a measured value exceeds the associated **upper** temperature threshold, the setpoint specification is set to its maximum value.
- Between thresholds, the setpoint specification increases in proportion to the temperature.

Working Behavior

The working behavior of the fan control is controlled by various variables:

- The digital inputs can be used to influence this setpoint.
- A digital input used to activate the change in direction of the fan. Alternatively, this can be activated after an interval defined by parameter settings.
- The time ramps at all inputs and outputs determine how quickly the fan control is modified or how quickly the digital output responds to temperature changes.

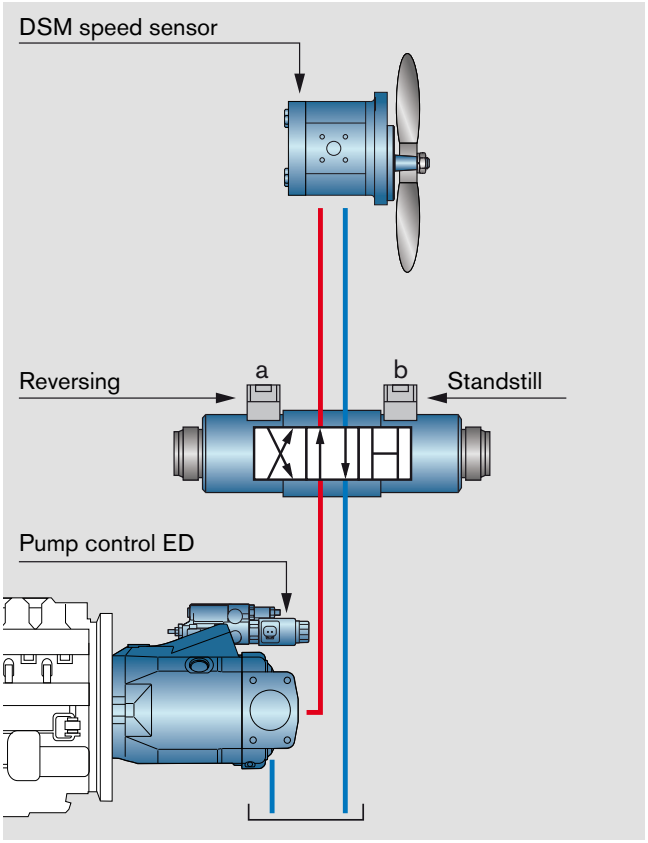
Reversing Function

The "Reversing" function is activated via a digital input (switch) or an adjustable interval.

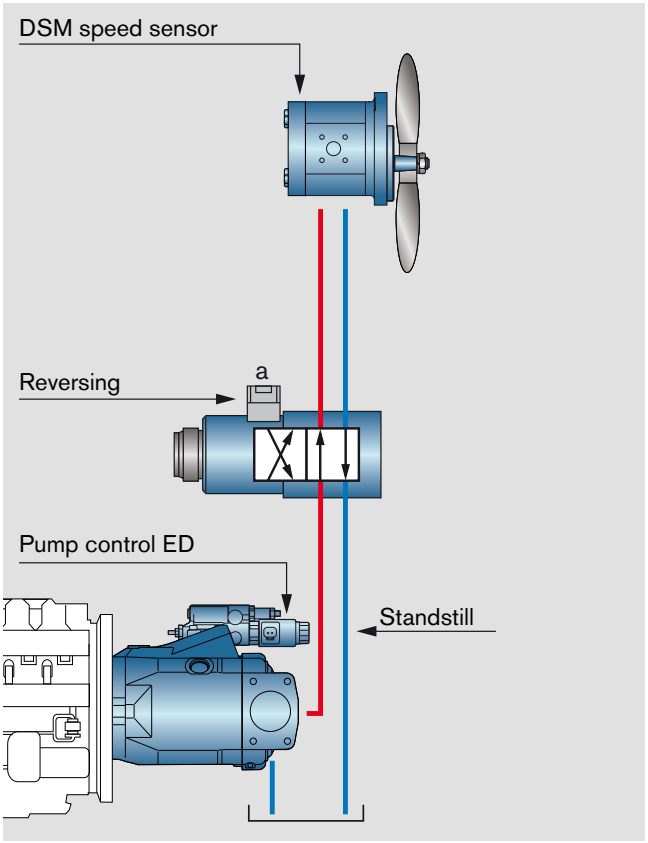
It is possible for both fixed pump systems and variable pump systems. When used, the fan is first brought to a standstill. The flow direction of the oil is then changed by the fan motor. This is realized either with the aid of a 4/3-directional valve (variant 1) or a 4/2-directional valve in combination with a fan standstill valve (variant 2).

The minimum control current may change to a different value when the direction of rotation is reversed depending on the different dynamics of the fan blades in order to prevent overspeeding of the fan motor during reversing operation.

Variant 1:
Reversing via 4/3-directional valve



Variant 2:
Reversing via 4/2-directional valve and standstill valve on the pump



Digital Output

In addition to controlling the pumps, the fan control can also be used to control a digital output. This is done by comparing the temperature values measured with the sensors with the set switching thresholds and the calculating the switching signal.

- If the measured value falls below the **lower** temperature threshold, the digital output is set to 0.
- If the measured value exceeds the **upper** temperature threshold, the digital output is set to 1.
- The range between the two thresholds is used as the hysteresis.

Safety Functions

The lines for the temperature inputs and proportional solenoid outputs are monitored for wire breaks and short circuits.

In the event of an error, the maximum setpoint is set and, thus, the fan fully controlled.

In the event of overheating, an error lamp is set and an overheating warning is given.

Important Features

- Up to four temperature sensors

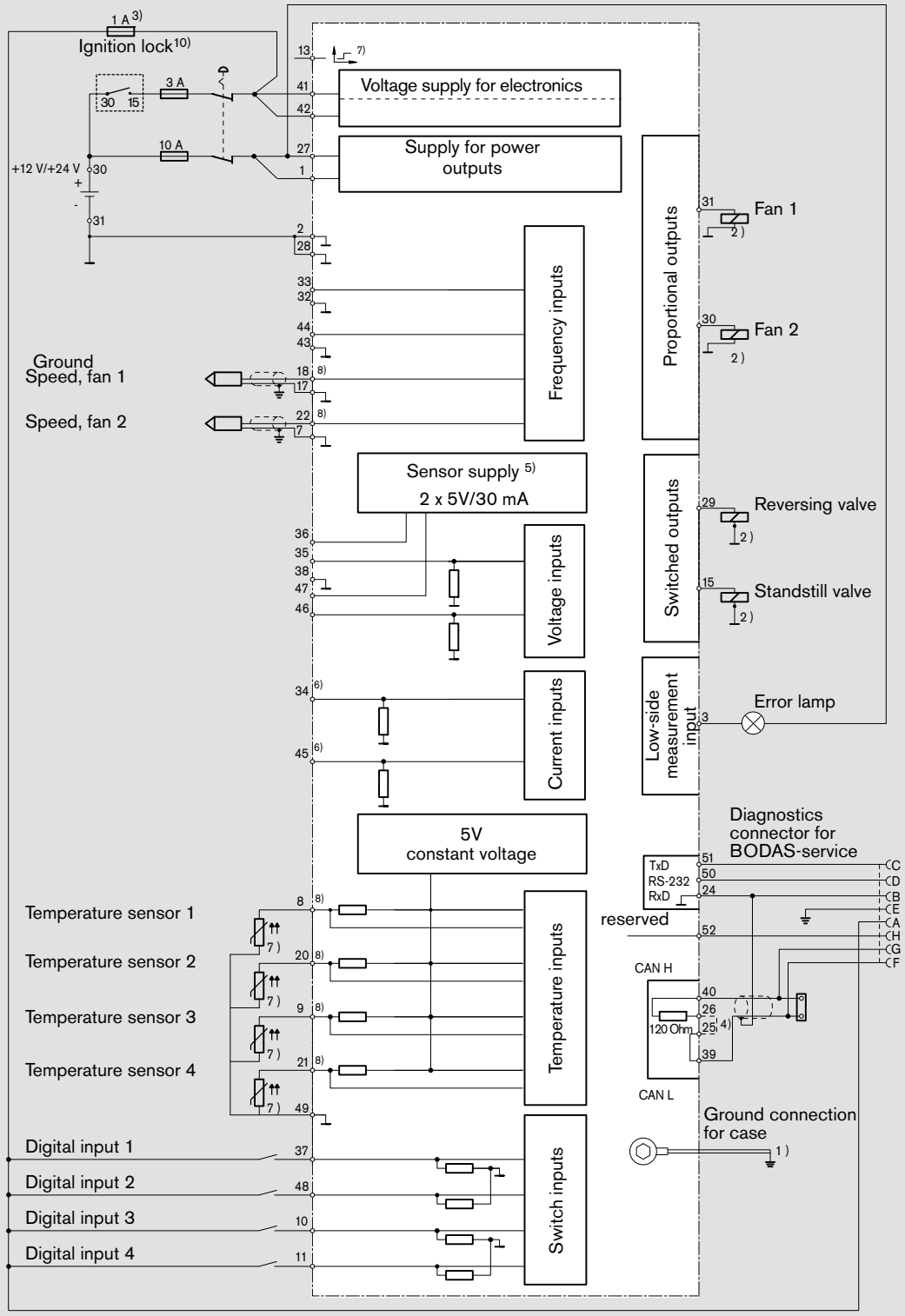
  There are default caracteristic curves for Bosch temperature sensors. A user-specific characteristic curve can be defined by parameter settings.
- CAN bus communication
- Up to four digital outputs to influence the setpoints via functions defined by parameter settings.
- Speed measurement via digital inputs
- Up to two independent fan drives
- Variable response via time ramps.
- Digital output can be actuated via temperature thresholds
- Reversing function
- Safety function
- Diagnostics function

  Any faults that occur are logged in the control unit and can be read later on using PC software BODAS-service in plain text.

Main Parameters

- Sensor curves
- Time ramps for temperature inputs
- Temperature thresholds for setpoints
- Digital input function module
- Switching threshold for digital output
- Output time ramps for fans
- Minimum and maximum solenoid current for pumps
- Change or direction
- CAN bus communication

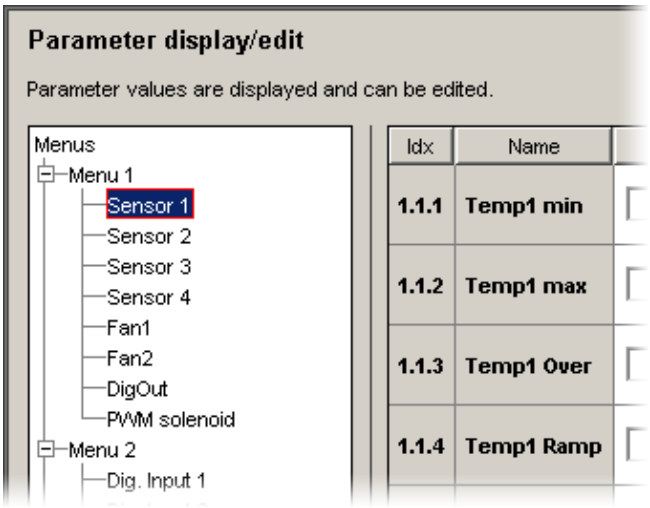
Connection Diagram



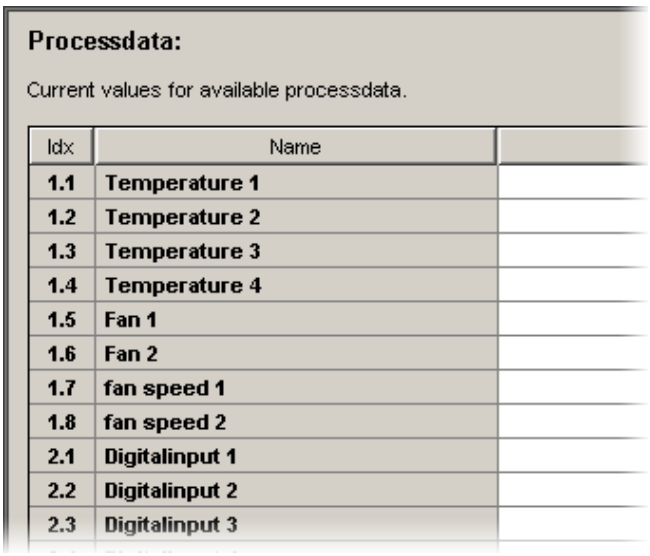
1) Short, low-resistance connection from a case screw to the device ground or vehicle ground
2) Separate ground connection from solenoid return line to battery (chassis possible)
3) Separate fuses needed for switches and sensors
4) CAN bus: termination resistor 120Ω recommended
5) Sensor supply for potentiometer and active sensors
6) Separate ground connection for current source to battery, control unit GND (pin 38/49) possible.
7) If ≥ 5V is applied to the input, all power outputs are off.
8) Can be used as switch inputs if connected externally to GND.
9) The terminals are labeled according to DIN 72 552. This does not apply for the controller.

Parameter Settings and Diagnostics

The parameters to be set when commissioning the AFC20 fan control can easily be adjusted using the BODAS-service PC software.



You can configure BODAS-service to display the most important process variables and the error messages for fault diagnostics and troubleshooting purposes.



Components Required

The following electronic components are needed:

- BODAS controller RC2-2/21 with mating connector, 52-pin (RD 95201)
- BODAS AS/AFC software, version 20

The following hydraulic components are needed:

Hydraulic concept A

- Variable pump with A10VO…ED electrohydraulic pressure control (RE 92707)
- AZM fixed motor (RE 14026)

Hydraulic concept B

- AZP fixed pump
  - Series F (RE 10089)
  - Series B (RE 10087)
  - Series N (RE 10091)
  - Series G (RE 10093)
- AZMF fixed motor (RE 14026)

The following electronic components can be used:

- PTC temperature sensor for air TSA (RE 95181)
- PTC temperature sensor for fluids TSF (RE 95180)
- Switch for digital inputs
- Error lamp
- Reversing valve

The following are required for commissioning and service:

- BODAS-service PC software (RE 95086)
- BODAS-service connection cable (RE 95086)
- Diagnostic socket (RE 95086)

Safety Instructions

- The suggested circuits do not imply any technical liability for the system on the part of Rexroth.
- The lines used for speed sensors are to be shielded. The shield must be connected to the electronics on one side or to the machine or vehicle ground via a low-resistance connection.
- Cables to the electronics must not be routed close to other power-conducting lines in the machine or vehicle.
- All connectors must be unplugged from the electronics during electrical welding operations.
- The electronics may only be tested with the proportional solenoids connected.
- The proportional solenoids must not be wired with spark-suppression diodes.
- Switching solenoids at the outputs of the controller RC do not need to be connected to spark-suppression diodes.
- Other inductive loads that are in the system but not connected to the controller RC must be connected to spark-suppression diodes.
- In order to preserve the warranty, any installation or replacement of the RC software (flash EPROM) must be performed by Rexroth personnel.
- Please observe the operating instructions contained in RE 95360-01-B.

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