DSR-100 Digital Static Regulation Systems

The DSR-100 is a Digital Static Regulation System intended to provide reliable excitation current for synchronous generators that are driven by Hydro, Gas, and Diesel machines.

A microprocessor-based controller is the heart of the excitation system that works in conjunction with a durable three phase SCR rectifier bridge that combines high efficiency with accurate response.

Several configurations of the DSR are available with different capabilities that offer an ideal solution for applications that require up to 50 and 80 Amps of current to the generator field.

MAIN FEATURES

- Microprocessor-based Digital Controller
- ±0.25% voltage regulation accuracy
- Softstart capability
- 0-3X V/Hz limiting
- VAR/PF control
- Voltage Matching
- Paralleling provisions
- Direct voltage sensing up to 600V (1 or 3 Phase)
- SCR-based power stage
- Multiple operating modes
- Easy-to-use BESTCOMS software for setup and system commissioning

Basler Electric

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TM-1
10-05

DESCRIPTION

The DSR excitation systems incorporate proven features and functions developed by Basler Electric from many years of experience in digital voltage regulation products.

The DSR was specifically designed as an easy replacement for aging small hydro and diesel excitation controls where the DSR offers the advantages of a multifunctional product in a compact and cost-effective package. (See Figure 1.)

Two models exist with different output current capability. Both the 50 and 80 Amp models consist of a metal chassis with a digital voltage regulator, firing module, freewheeling diode, and a three phase non-inverting power bridge.

DIMENSIONS

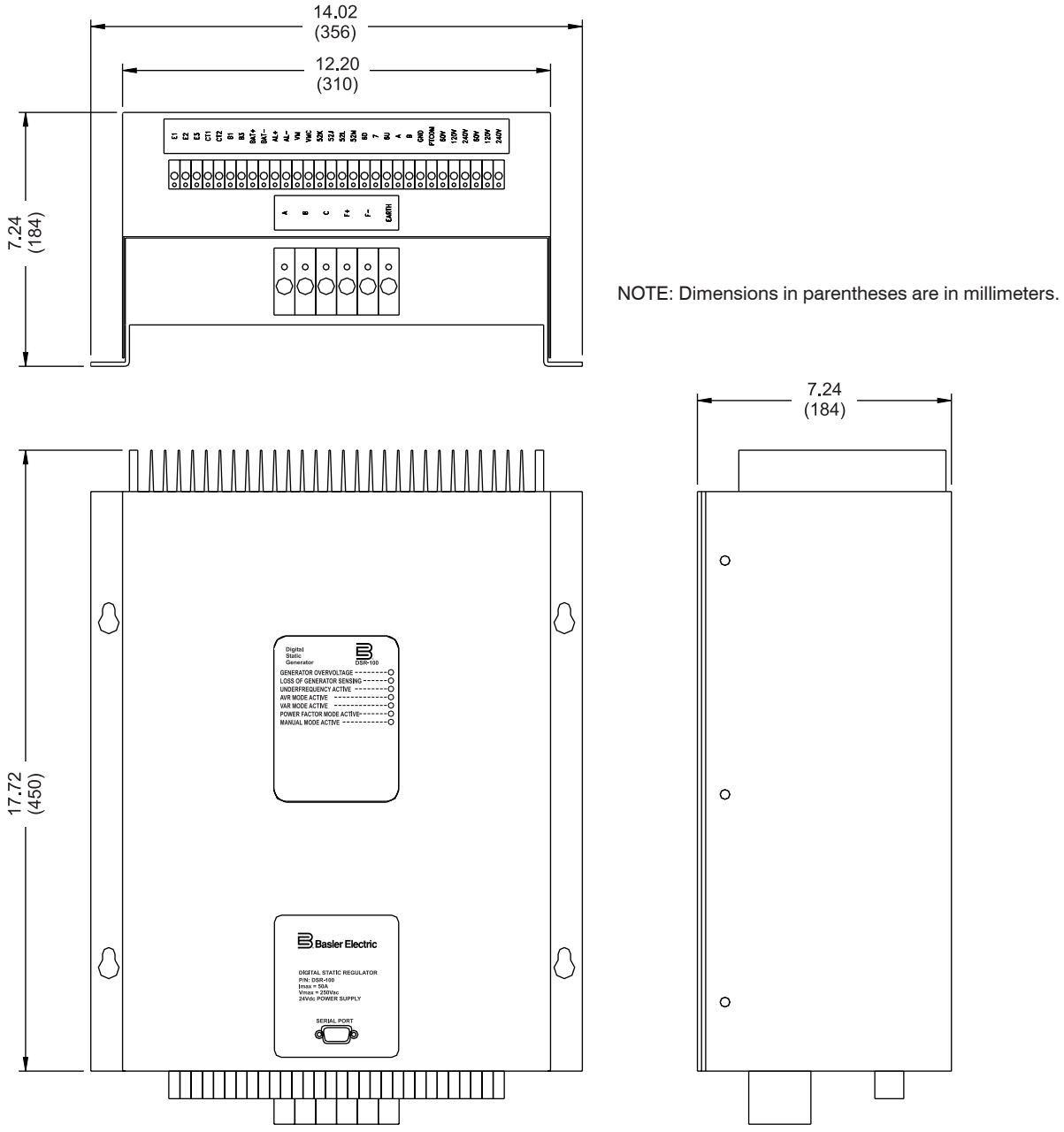


Figure 1 - Typical Outline for 50/80A Model

FUNCTIONAL DESCRIPTION

Stability
20 standard stability ranges are provided, as well as one customizable stability range to optimize system performance. The BESTCOMS PC software provides PID selection software and a sophisticated response time program to facilitate verification of stability performance.

Front Panel Annunciation
The DSR-100 main controller provides seven LEDs to indicate generator system and DSR-100 conditions without requiring connection to the communications device.

Protection
Two protection functions have the ability to be user-programmed to shut down the DSR-100 and close the alarm contact. They are:

- Generator Overvoltage
- Loss of sensing voltage

Voltage Matching
This function allows the DSR-100 to match the bus voltage prior to synchronizing. This voltage matching feature replaces the same function that was typically performed manually or as part of an autosynchronizer, thereby saving money by allowing the use of a less expensive synchronizing device.

Softstart
Softstart functions as a voltage limiter during generator buildup. It limits the generator voltage overshoot typically present when machines are initially started.

Var/Power Factor Control
Integrated Var/PF controls save the user the cost of purchasing and installing remote devices that perform the same functions. This function is typically used on utility-paralleled generators that cannot control the grid voltage. Once set, the Var and PF of the generator output will be regulated.

External Adjustments
The DSR-100 allows for multiple points and methods of external adjustment of the active regulation mode.

There are three methods of adjustment:

- Contact input
- Auxiliary voltage input (±3 Vdc)
- PC adjustment (BESTCOMS)

The PC communications also can change operating modes and set points.

V/Hz Limiting

The DSR-100 provides a 0-3 times p.u. V/Hz slope adjustment in conjunction with an adjustable corner frequency roll-off point ranging from 45 to 65 Hz. These parameters allow the DSR to precisely match the operating characteristics of the prime mover and the loads being applied to the generator (see Fig. 2).

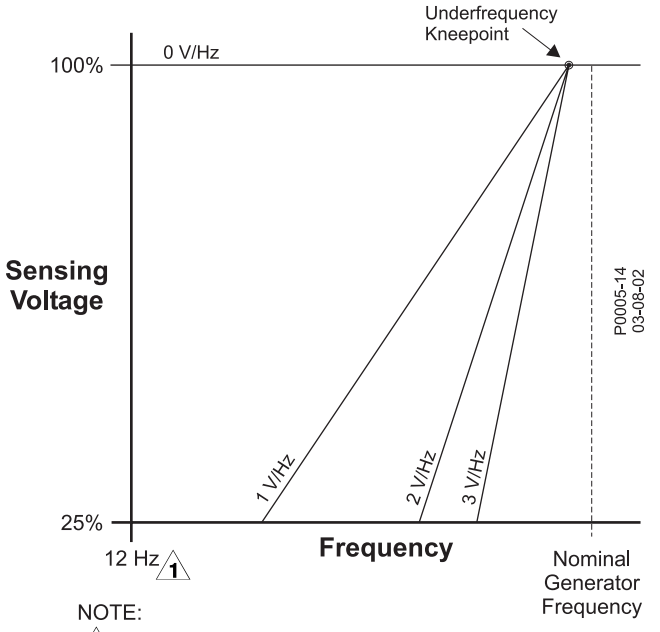


Figure 2 - Volts per Hertz Curves

GENERAL SPECIFICATIONS

Regulation
±0.25% over the load range at rated PF and constant generator frequency
±0.5% with 3 phase sensing and shunt power at 40% THD of a 6 SCR rectifier bridge

Regulation drift
0.5% for a 40°C change

Voltage adjust range
±15% of nominal

Response time
< 1 cycle

Generator and Bus Sensing input (1 or 3 phase)
50 Hz Range 1: 100 Vac (85 to 132 Vac)
Range 2: 200 Vac (190 to 220 Vac)
Range 3: 400 Vac (380 to 440 Vac)
60 Hz
Range 1: 120 Vac (85 to 132 Vac)
Range 2: 240 Vac (170 to 264 Vac)
Range 3: 480 Vac (340 to 528 Vac)
Range 4: 600 Vac (540 to 660 Vac)

V/Hz Characteristic

Slope:	Adjustable from 0 to 3.00 PU in 0.1 increments
Corner Frequency:	Adjustable from 40 to 65 Hz (See Fig. 4 for V/Hz curves.

Control Power Input

Voltage Nominal:	24Vdc
Voltage Range:	18 to 30Vdc
Burden:	10W

Contact Inputs

Unit/Parallel:	Selection
Var/PF:	Enable/Disable
Voltage Matching:	Enable/Disable
Type:	Dry Contact
Wetting Voltage:	16Vdc (supplied by DSR-100)

Generator Current Sensing

Type:	1 phase (B-phase), 50/60Hz
Rating:	1 or 5 Amps (option)
CT ratio range:	1.0 to 5,000.0 in 0.1 increments
Burden:	<0.1 VA

Common Alarm Output

Type:	Form A
Rated load:	7 Aac/Adc continuous
Make:	30 Aac/Adc, carry for 0.2 sec
Break:	7 Aac/0.1 Adc
Operating voltage:	240 Vac/250 Vdc maximum

Accessory Input

Voltage range:	-3 Vdc to +3 Vdc
Set point range:	-30% to +30% shift
Burden:	1 kΩ

Var Operating Mode

Adjustment range:	100% to -100%
Increment:	0.1%

Power Input and Output Ratings

Model	Continuous Output Current Rating	Forcing Output Current (10 sec.)	Full Load Rated Output Voltage	Forcing Output Voltage (10 sec.)	Power Input Voltage (3-Phase 50/60Hz)	Input Power Burden
DSR-100-5XX (50 Amp)	50 Adc	80 Adc	50 Vdc	80 Vdc	60 Vac	6 kVA
			100 Vdc	160 Vdc	120 Vac	12 kVA
			200 Vdc	320 Vdc	240 Vac	24 kVA
DSR-100-8XX (80 Amp)	80 Adc	130 Adc	50 Vdc	80 Vdc	60 Vac	8 kVA
			100 Vdc	160 Vdc	120 Vac	16 kVA
			200 Vdc	320 Vdc	240 Vac	32 kVA

For other excitation voltage and current levels, consult Basler Electric.

GENERAL SPECIFICATIONS, continued

PF Operating Mode
Adjustment range: 0.6 lead to 0.6 lag
Increment: 0.001

Parallel Compensation
Modes: Reactive Droop and Reactive Differential (cross-current)*
Droop Adjust Range: 0 to 10%
Increment: 1%
* Burden can exceed 1 VA if external resistors are added to the CT circuit.

Generator Overvoltage Protection
Pickup: 100% to 120% of system voltage setting
Increment: 1.0%
Time delay: 0.75 seconds (fixed)

Soft Start Function (AVR Mode only)
Time Adjust Range: 1 to 7,200 seconds
Increment: 1 second

Voltage Matching
Accuracy: Generator rms voltage matched to Bus rms voltage to within ±0.5% of the generator voltage
Time adjustment range: 1 to 300 seconds
Increment: 0.01 seconds

Dimensions
See Figure 1.

Operating and Storage Temperature
-10° C (+14° F) to +45° C (+113° F)

CONNECTIONS

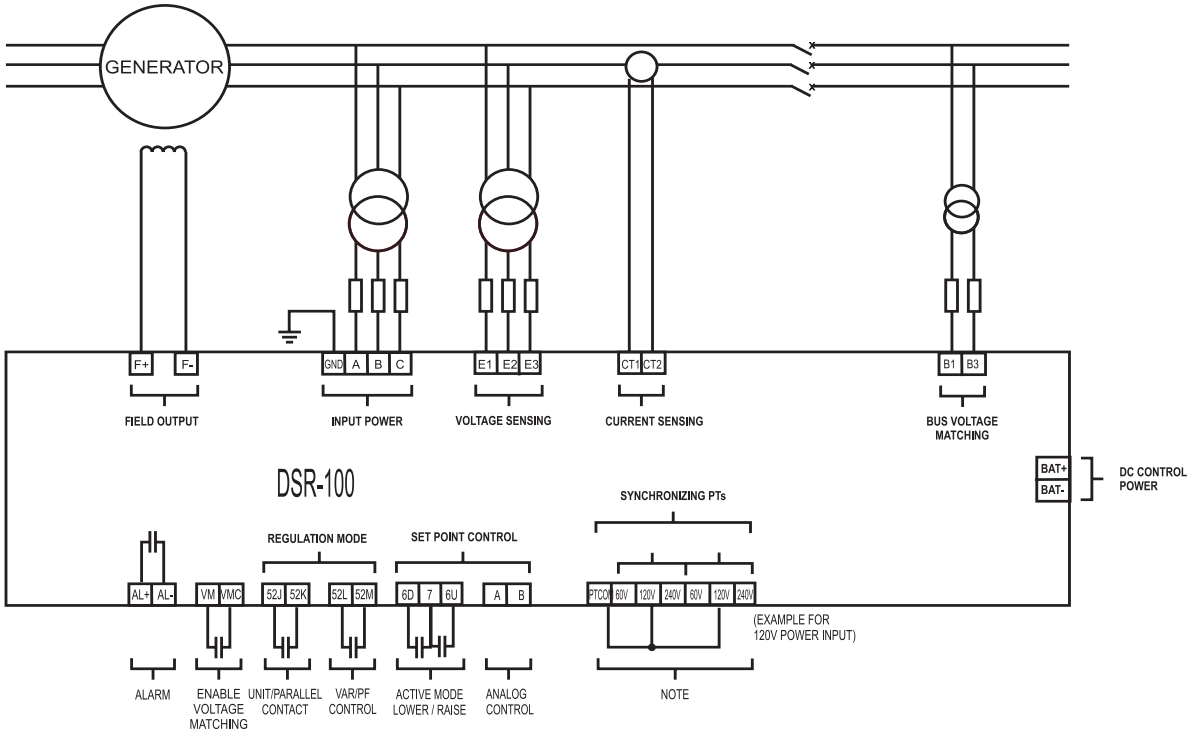


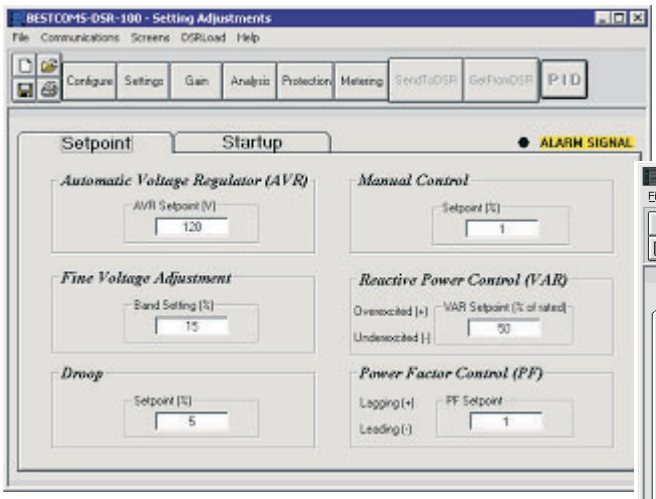
Figure 3 - Typical Connection Diagram

COMMUNICATIONS

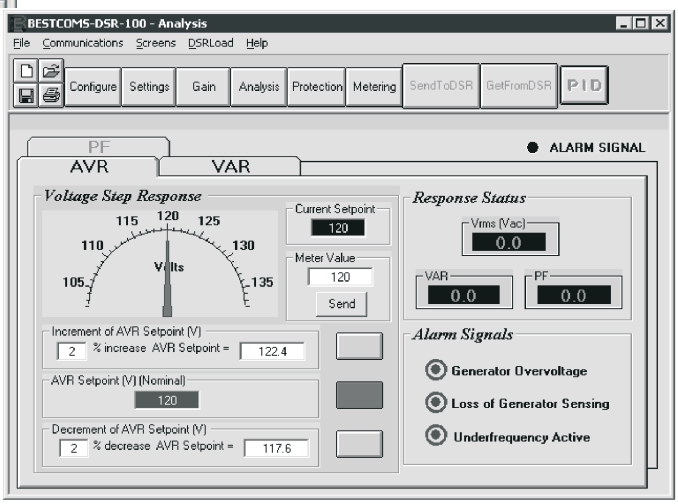
PC (Windows® 95, 98, 2000, NT, Me, XP compatible) communications software is provided free of charge by Basler Electric with every DSR-100 unit.

The PC BESTCOMS allows for total setup, control, and monitoring of all parameters of the DSR-100. It allows for custom PID selection and has a monitoring screen for viewing all generator parameters in actual machine levels.

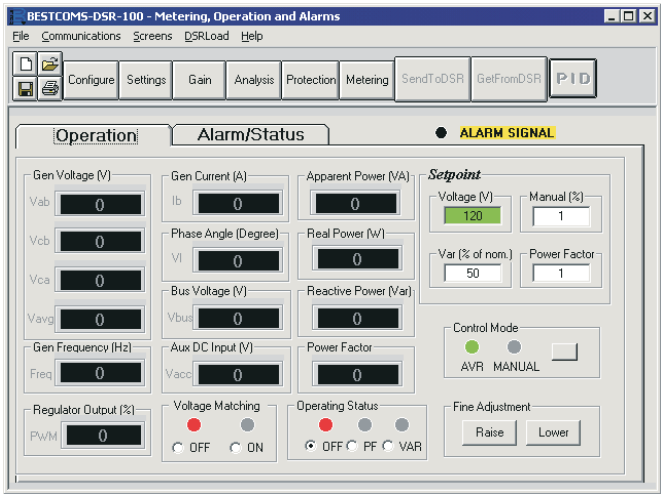
The RS-232 DB9 connector is used for communication with BESTCOMS. This software is on a single CD-ROM, along with the instruction manual and product bulletin.



Setting Screen



Analysis Screen



Metering Screen

Figure 4 - BESTCOMS Software Screens

OPTIONS

POWER TRANSFORMER

Power for the excitation system is usually derived from the generator via a large kVA transformer. The transformer steps down the generator terminal voltage to be compatible with the field's requirements and to fix the forcing ratio of the system. The transformer will provide the excitation system's full load rating, plus a voltage and kVA margin for accommodating short time field forcing to handle generator transient overload requirements. The power (kVA) and secondary voltage will limit the maximum amount of power delivered to the field (forcing conditions). The PPT typically is sized to have a forcing ratio ([Max. voltage]/[Nominal voltage]) between 1.4 to 2.

Type	Dry
Standard Primary voltage	Sized per application
Power (kVA)	Sized per application
Frequency	50 or 60 Hz

The power transformer is quoted separately for each application, based on system data provided on the Ordering Information page.

EXTERNAL CONTROL POWER SUPPLY

The DSR-100 requires 24 Vdc control power to operate. If 24 Vdc is not directly available, an external power supply can be utilized. Basler Electric Part Number 9334503100 is a 24 Vdc, 32 Watt power supply that accepts 85 to 265 Vac (47 to 400 Hz) and 110 to 330 Vdc.

ORDERING INFORMATION

To place your order and verify the interface between the DSR solution and your system, simply fill in the following data sheet and forward it to your nearest Basler Electric Representative. The data with this sign (*) are absolutely necessary.

Customer name: _____

Project/location name: _____

1) Generator Output Data

Power (in kVA)* _____ Voltage (in V)* _____

Frequency (in Hz) _____ Power factor _____

2) Excitation Field Data

Current at no load _____ Voltage at no load _____

Current at full load* _____ Voltage at full load* _____

3) Forcing ratio

Typically 1.6 times the excitation voltage at full load _____

4) EXCITATION TRANSFORMER

Quotation requested? (Yes/No) _____

Connected on generator terminals? _____ If no, provide voltage available _____

5) CT and PT ratio for the sensing circuit

PT RATIO		**CT RATIO**	
a) Primary voltage	_____	a) Primary current	_____
b) Secondary voltage*	_____	b) Sec current (1 or 5A)*	_____
c) App Power (25VA min)	_____	c) Burden (in VA)	_____
d) Single or 3 phase	_____	d) Installed in phase?	_____

6) Control power supply voltage level (DSR accepts 24Vdc)

Specify voltage available, if other than 24 Vdc. _____

The information included in this introductory document is subject to change without notice and is intended for general information only.

If you would like further information on these systems or any of the Basler excitation system range, please contact us at one of the addresses in your area as listed below.

USA and Americas: Basler Electric USA
China: Basler Electric China
Rest of the world: Basler Electric France

ISO Basler System Quality Registered
Highland, IL: ISO 9001
Wasselonne, France: ISO 9001
Taylor, TX: ISO 9001

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