

DSR - 100

Digital Static Regulation Systems

APPLICATION:

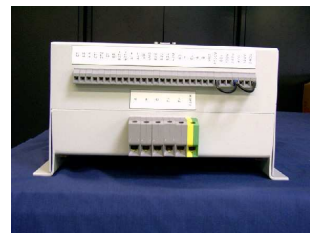
Basler Electric offers a New Line of digitally controlled brush (static) or brushless excitation systems designed for use with existing Hydro, Gas as well as Diesel driven generators requiring high efficiency and reliability at a reasonable cost.

The heart of the system is a DSR 100 Digital Static Regulator used in conjunction with standard SCR based rectifier bridges.

The DSR excitation system is an ideal standard package for generators up to around 10 MW having field excitation requirement up to 200A. For Higher current ratings please contact Basler.

Based exclusively on standard designs the DSR offers a cost effective solution for these applications while providing a high level of performance and reliability for the power generation system.

Several configurations of our standard system are available either to be mounted in a compact enclosure (up to 80 Amps), in a free standing cubicle as well as on a metal chassis for installation within your existing cubicle. (Up to 200A)



MAIN FEATURES:

- Micro-processor based DSR Digital controller
- +/- 1% Voltage regulation accuracy
- SCR based power rectifier bridges
- Multiple operating modes
- Easy to use Bestcom software for setup and testing
- High reliability
- Highly cost effective
- Available in compact enclosure, on chassis or in a cubicle
- Factory wired and tested

DESCRIPTION and SPECIFICATIONS

FEATURES and FUNCTIONS

INTERCONNECT DIAGRAM

FRONT, SIDE VIEWS and DIMENSIONS

ORDERING



INTRODUCTION

The DSR excitation systems incorporate features and functions developed by Basler Electric after 15 years experience in digitally controlled Excitation and Voltage regulation products.

The systems are designed to meet main field as well as exciter field requirements up to 200A with standard field voltages up to 250Vdc.

Specifically designed as an easy replacement of aging Mini Hydro and Diesel excitation controls, the DSR system offers the advantages of multi-control digital voltage regulation in a compact and Cost Effective package.

DESCRIPTION

The DSR system mainly consists of a metal chassis complete with the voltage regulator, power bridge, firing card controlling the SCR bridge and field flashing/discharge circuits. The panel version also include HMI through pushbuttons and indication lamps as well as metering instruments. The chassis can be supplied loose for assembly within your existing cubicle, fully assembled in an IP21 free standing cubicle or assembled in a wall mounted cabinet. (for critical space requirements above 80A)

Excitation system: A DSR 100 Controller mounted with its firing card is the heart of the system. Inputs to the DSR 100 are generator voltage, B-phase Generator current, control power, Bus voltage (for voltage matching) and inputs and outputs for remote control of the system.

A RS 232 port with easy access provides means for local set up and control of the system using Basler user friendly Bestcom software.

A crow bar discharge circuit and associated discharge resistance are included to provide de-excitation (Panel mounted system only).

Power potential Transformer (PPT): As an option, Basler offer a three phase power transformer as a loose item or mounted in the enclosure when possible. The PPT is to be connected to the generator output bus in shunt fed applications or from a station AC source. The PPT Kva is determined by the full load field power requirements and therefore sized according to the application.

GENERAL SPECIFICATION

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 the voltage waveform

Regulation drift:

+/- 0.5% for a 40°C change

Regulation response:

Within 1 cycle

Voltage adjust range:

+/- 15% of nominal

Sensing input (1 or 3 phase)

50 Hertz Sensing

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 Hertz Sensing

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)

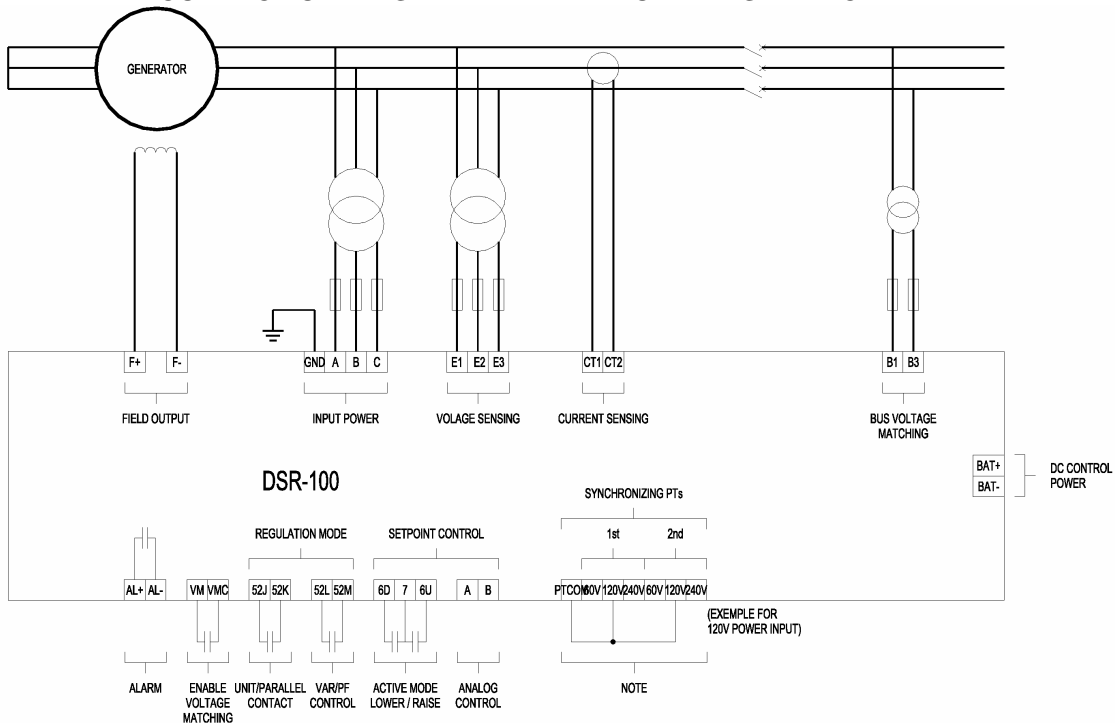
Dimensions: L x H x W mm

Chassis: Custom or standard (?)
 Panel: Standard (610 x 2155 x 625 mm)
 Small cabinet: Standard (450 x 356 x 184 mm)

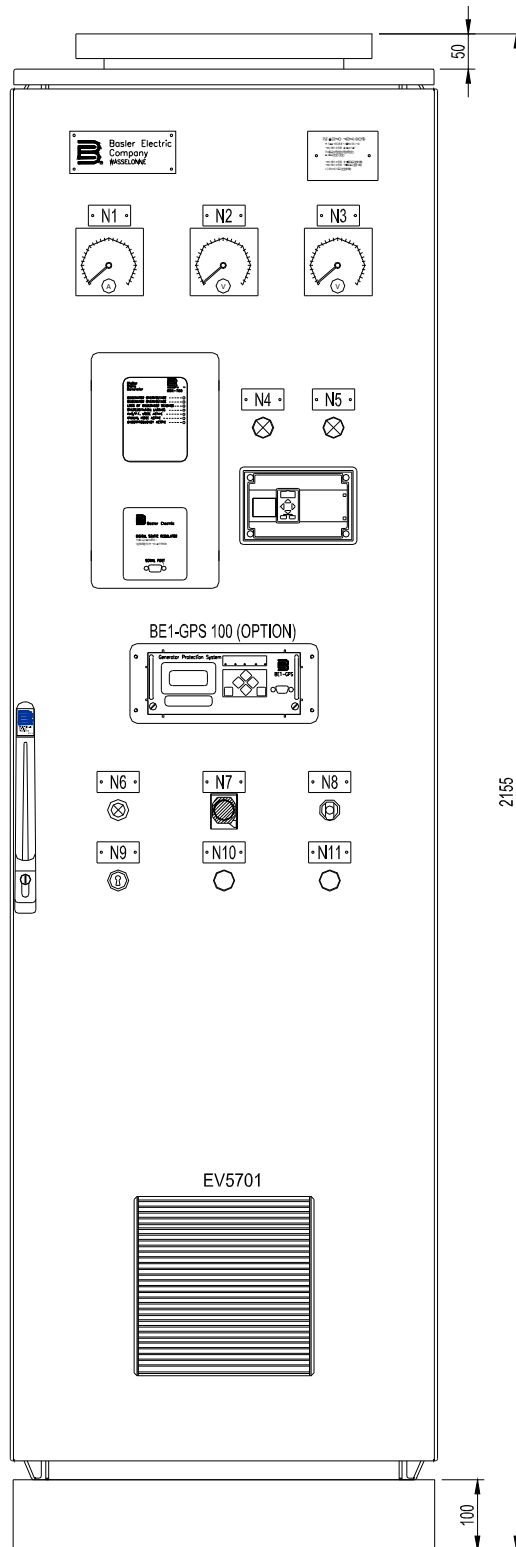
Operating Temperature:

0°C to +45°C

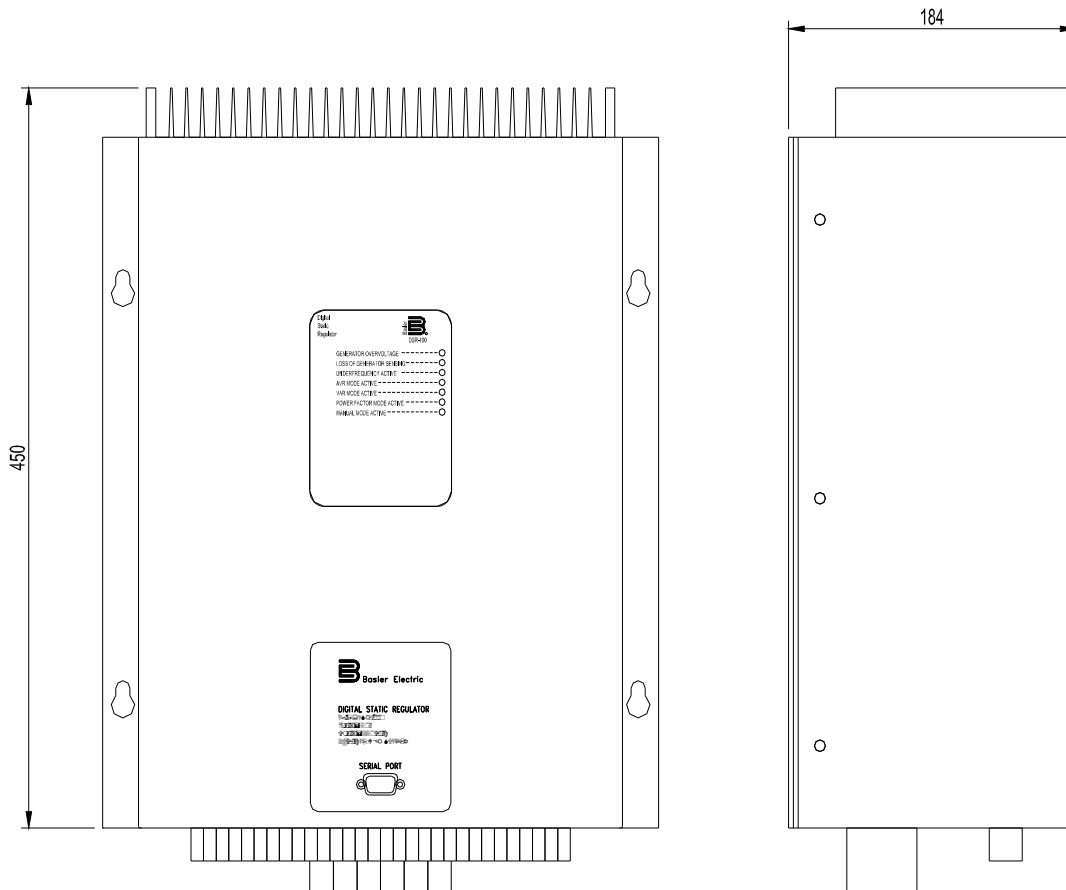
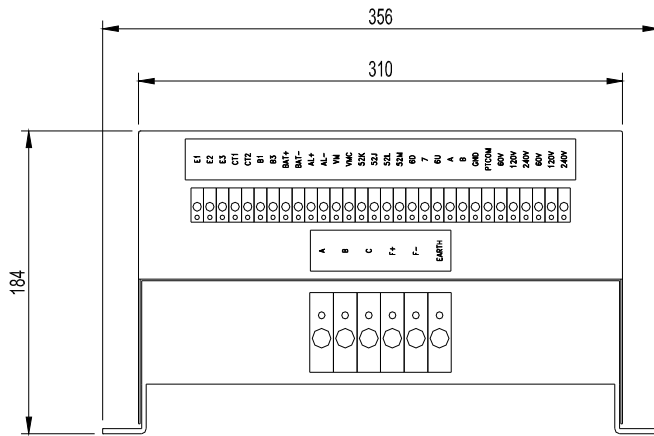
CONNECTION DIAGRAM EXAMPLE FOR THE SMALL CABINET



MECHANICAL LAY OUT OF THE PANEL



MECHANICAL LAY OUT OF THE SMALL CABINET



DSR 100 FUNCTIONAL DESCRIPTION:

Stability

20 standard stability ranges are provided, as well as one customizable stability range for customized performance. The PC BESTCOMS 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 feature replaces the same function in the automatic synchronizer, thereby saving money by allowing the use of a less expensive synchronizing device.

Softstart

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

VAR/PF 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 or 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 for adjustment:

- Contact input
- Auxiliary voltage input (+/- 3 Vdc)
- PC adjustment (BESTCOM)

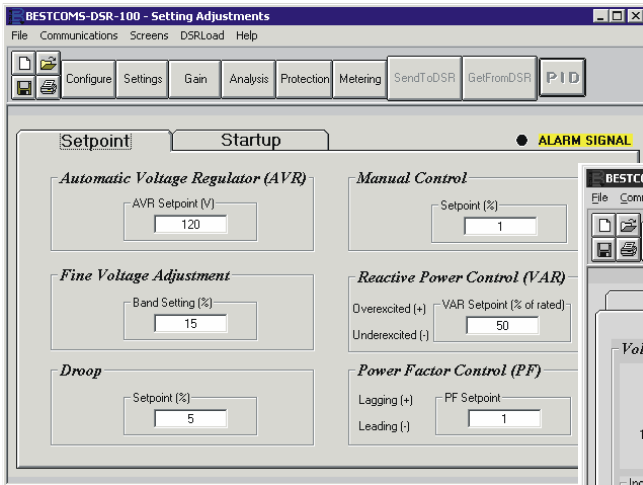
The PC communications also can change operating modes and set points.

COMMUNICATIONS:

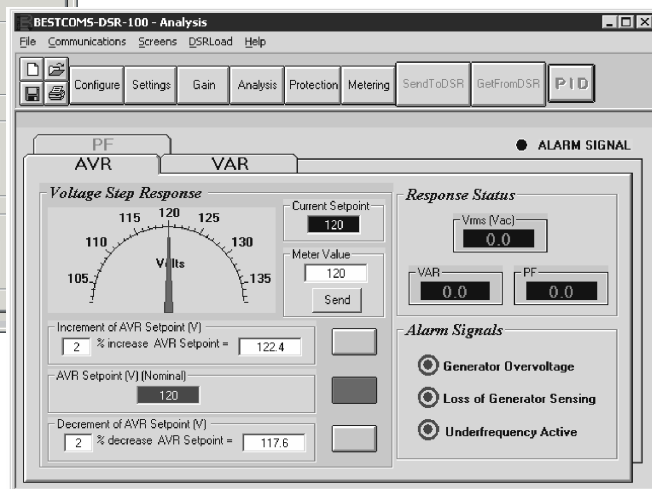
PC (Windows[®] 95, 98, 2000, NT, Me, XP compatible) communications software is provided free of charge by Basler Electric with every DSR-100 units.

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.

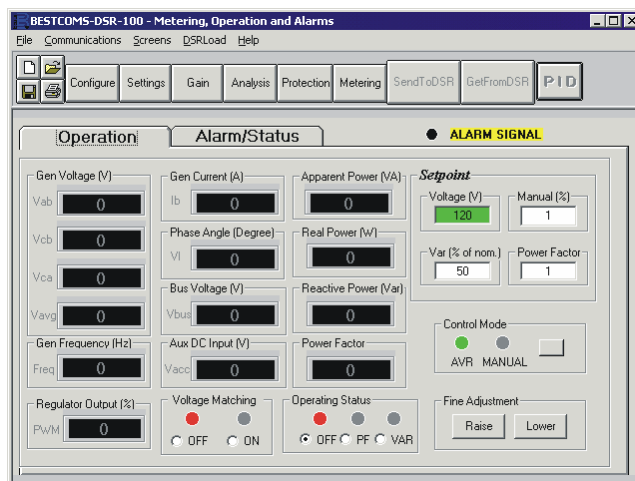
The RS-232 DB9 connector used for communication with BESTCOM. This software is on a single CD-ROM along with the instruction manual and product bulletin.



BESTCOM Software window (setting screen)



BESTCOM Software window (analysis screen)



BESTCOM Software window (metering screen)

OPTIONS

GENERATOR PROTECTION BE1-GPS100 (available in option for the panel solution only)

The relay system provides protection, monitoring, local and remote control, and standard automation protocols. Relay self-checking functions are included. The relay system comes with a 7-year warranty. For further details refer to technical product bulletin UHQ.

| ANSI Code | VOLTAGE PROTECTION | ANSI Code | OVERCURRENT PROTECTION |
|-----------|---|-------------|---|
| 24 | Volts per Hertz Over-excitation Protects against transformer and generator over-excitation conditions. | 50/51 | Phase Faults Single phase instantaneous overcurrent element. |
| 27/59 | Phase Under/Overvoltage 2 phase undervoltage and overvoltage elements for detecting single or multiphase voltage events. | 50N/51 N | Ground Faults Neutral instantaneous overcurrent element and 2 neutral time overcurrent elements that operate on calculated residual (3I0) |
| 27/59X | Auxiliary voltage protection: 2 undervoltage and overvoltage elements that monitor phase residual voltage (3V0) for detecting grounds on a delta system. | 46 | Negative Sequence Current Detection of unbalanced loading and phase faults. |
| 47 | Negative Sequence Overvoltage for detecting phase unbalance and reverse phase rotation. | | OTHER PROTECTIONS |
| 60FL | Fuse Loss Detection Protects against false tripping for a blown sensing fuse. | 25 | Synchronism Check This protection shall check for phase angle difference, voltage magnitude difference, frequency difference (slip) and if the 3-phase VT source voltage frequency is greater than the auxiliary VT frequency. |
| 81 O/U | Under/Overfrequency (81O/U) The relay includes 6 frequency elements for detection of power system frequency disturbances. | 32 | Directional Power Sensitive power elements that can be independently set forward or reverse. |

Together with protection the BE1 GPS offers the following Control and Monitoring features

Reporting and Alarms:

- Oscillography and Sequential Events Recorder (SER):
- Demand Metering
- Circuit Breaker Monitoring

Communications:

- Relay Interface
Front and rear RS-232 port
Rear RS-485 port : Supports ASCII, Modbus or DNP3.0 option
- PC Interface
Windows®-based graphical user interface and ASCII terminal interfaces.
PC Software: compatible with Windows 98, NT, 2000, XP Home, XP Professional, and Me
- Inputs/Outputs



LOCAL / REMOTE CONTROL USING PLC (AVAILABLE ONLY IN PANEL SOLUTIONS)

To supervise the excitation system, a PLC is used thus allowing to control with the system in a simple and easy way.

Features and Dialogue

The PLC controls the management of faults which appear in the system. After processing the signals may be used taken to a console to inform an operator. Appropriate measures may then be taken to avoid the system deterioration.

With an HMI, the PLC can indicate the system state, system fault as well as their nature.

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 also 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 is typically sized to have a forcing ratio ([Max. voltage] / [Nominal voltage]) between 1.4 to 2. A power potential transformer could be replaced by any other AC source if the power needed for the excitation is sufficient. An optional cover can be quoted upon request to protect the transformer.

| | |
|---------------------------------|-----------------------|
| Type | Dry |
| Standard Primary voltage | Sized per application |
| Power (Kva) | Sized per application |
| Frequency | 50 or 60 Hz |
| Connection | Yd11 |

The power transformer is quoted separately for every application based on demand.

MAIN CHARACTERISTICS

| | | | | |
|---------------------------------|------------------------|----------------|--|----------------------------------|
| <i>Digital controller</i> | DSR-100 | | | |
| <i>Assembly</i> | Small cabinet | | Cubicle | Mounting plate |
| | Type 50 | Type 80 | | |
| <i>Generator size (max)</i> | 10MW | | | |
| <i>DC Output current (max)</i> | 50A | 80A | 200A | ACTUALLY BEING DEVELOPPED |
| <i>DC Output voltage (max)</i> | 200V | | 250V | |
| <i>DC Forcing current (max)</i> | 80A / 10 secs | 130A / 10 secs | 400A / 10 secs | |
| <i>Field resistance</i> | 0.8 - 12 Ohms | 0.5 - 4 Ohms | 0.2 - 3 Ohms | |
| <i>Response time</i> | Less than 1 cycle | | | |
| <i>Rectifier type</i> | 3 SCRs | 3 SCRs | 6 SCRs | |
| <i>Discharge</i> | Free wheel diode | | Crowbar + fast discharge resistor | |
| <i>Field flashing circuit</i> | Not included | | Yes from 100 - 400Vac supply | |
| <i>Options available</i> | Excitation transformer | | Digital network analyzer | |
| | | | Generator protection | |
| | | | Excitation transformer | |
| <i>Auxiliary power supply</i> | 24Vdc | | 24 Vdc, 100-250Vac or 100 - 300Vdc | |

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 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 ?(Y/N) _____

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

5) CT & PT ratio for the sensing circuit :

PT RATIO

a) Primary voltage : _____

b) Secondary voltage : (*) _____

c) App Power (25VA min) _____

d) Single or 3 Phase : _____

CT RATIO

a) Prim Current : _____

b) Sec Current (1 or 5A) (*) _____

c) Burden (in VA) : _____

d) Plugged on V phase?: _____

7) Control power supply available (24Vdc recommended):

Voltage available (Please also confirm AC or DC): (*) _____

8) Power source available for the field flashing: (if used)

Voltage available (Please also confirm AC or DC): (*) _____

10) Size of the equipment : (Max space available for mounting plates only)

Height : _____ Width : _____ Depth : _____



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 feel free to contact us at one of the addresses in your region as listed below.

USA and Americas: Basler Electric USA

China: Basler Electric China

Rest of the world: Basler Electric France

**P.A.E. Les Pins
67 319 Wasselonne
France**

**Tel : +33 (0)3 88 87 10 10
Fax : +33 (0)3 88 87 08 08
Mail : beifrance@basler.com**

**P.O. Box 269
Highland Il. 62249
United States**

**Tel : +1 618 654 2341
Fax : +1 618 654 2351
Mail : info@basler.com**

**N°1300 Zhong Shan BEI Lu Dev
Zone, Suzhou, Jiangsu Province
People Republic of China**

**Tel : +86-512-6346-1730
Fax : +86-512-6346-1760
Mail : beichina@basler.com**

