

31 • Specifications

DECS-250 electrical and physical characteristics are listed in the following paragraphs. Specifications for the AEM-2020 and CEM-2020 can be found in their respective chapters.

Operating Power

Voltage Range

For 32 Vdc Excitation Power 56 to 70 Vac

For 63 Vdc Excitation Power 100 to 139 Vac or 125 Vdc

For 125 Vdc Excitation Power ... 190 to 277 Vac single-phase, 190 to 260 Vac three-phase,
or 250 Vdc

Frequency Range..... dc, 50 to 500 Hz

Caution

For redundant applications with a single-phase, 300 Hz Marathon® PMG, only one DECS-250 can be connected to the PMG at a time. In redundant applications, a contactor should be used for each DECS-250 power input or equipment damage may result.

If operating power exceeds 260 Vac, the connection must be configured as L-N single-phase or equipment damage may result.

Table 31-1 lists the required nominal operating power voltage and configuration required to obtain 32, 63, and 125 Vdc continuous field power for the DECS-250.

Table 31-1. Operating Power Requirements

Excitation Power	32 Vdc	63 Vdc	125 Vdc
Input Power Configuration	1- or 3-phase	1- or 3-phase	1- or 3-phase
Nominal Input Voltage	60 Vac	120 Vac	240 Vac
Full Load Continuous Voltage	32 Vdc	63 Vdc	125 Vdc
Full Load Continuous Current	15 Adc (20 Adc up to 55°C (131°F))		
Minimum Residual Voltage for Buildup	6 Vac		
Operating Power Input Burden at 15 Adc Excitation Output	780 VA	1,570 VA	3,070 VA
Operating Temperature at 15 Adc Excitation Output	-40 to +70°C (-40 to +158°F)		
Operating Power Input Burden at 20 Adc Excitation Output	1,070 VA	2,100 VA	4,170 VA
Operating Temperature at 20 Adc Excitation Output	-40 to +55°C (-40 to +131°F)		

Control Power

Two control power inputs enable continued operation if one of the two inputs is lost. The control power voltage rating is determined by the device style number.

Style LXXXXXX

DC Input

Nominal Input	24 or 48 Vdc
Input Range	16 to 60 Vdc
Burden	30 W

Style CXXXXXX

AC Input

Nominal Input	120 Vac, 50/60 Hz
Input Range	82 to 132 Vac, 50/60 Hz
Burden	50 VA

DC Input

Nominal Input	125 Vdc
Input Range	90 to 150 Vdc
Burden	30 W

Terminals

AC Input	L, N
DC Input	BATT+, BATT-

Generator and Bus Voltage Sensing

Type	1-phase or 3-phase-3-wire
Burden	<1 VA per phase

Terminals

Generator Voltage Sensing	E1, E2, E3
Bus Voltage Sensing	B1, B2, B3

50/60 Hz Sensing Voltage Nominal Input Range

100 to 600 Vac, $\pm 10\%$

Generator Current Sensing

Configuration	4 inputs: A-, B-, C-phase, and cross-current compensation CT input
Type	1-phase (B-phase), 1-phase with cross-current compensation, 3-phase, 3-phase with cross-current compensation
Range	1 Aac or 5 Aac nominal
Frequency	50/60 Hz
Burden	<1 VA for 1 Aac or 5 Aac sensing

Terminals

A-Phase	CTA+, CTA-
B-Phase	CTB+, CTB-
C-Phase	CTC+, CTC-
Cross-Current Compensation	CCCT+, CCCT-

Accessory Inputs

Current Input

Range.....	4 to 20 mAdc
Burden.....	Approximately 500 Ω
Terminals.....	I+, I-

Voltage Input

Range.....	-10 to +10 Vdc
Burden.....	>20 k Ω
Terminals.....	V+, V-

Metering Accuracy

Generator Voltage (each phase and average)	$\pm 1\%$ of rated
Bus Voltage.....	$\pm 1\%$ of rated
Generator and Bus Frequency.....	± 0.1 Hz of rated
Generator Line Current	$\pm 1\%$ of rated
Generator Apparent, Active, and Reactive Power	$\pm 1\%$ of rated
Power Factor.....	± 0.02
Field Current and Voltage	$\pm 1\%$ of rated
Accessory Input.....	$\pm 1\%$ of rated

Contact Inputs

Type	Dry contact, accept PLC open-collector outputs
Interrogation Voltage.....	12 Vdc

Terminals

Start.....	START, COM A
Stop	STOP, COM A
Programmable Input 1.....	IN 1, COM A
Programmable Input 2.....	IN 2, COM A
Programmable Input 3.....	IN 3, COM A
Programmable Input 4.....	IN 4, COM A
Programmable Input 5.....	IN 5, COM A
Programmable Input 6.....	IN 6, COM A
Programmable Input 7.....	IN 7, COM B
Programmable Input 8.....	IN 8, COM B
Programmable Input 9.....	IN 9, COM B
Programmable Input 10.....	IN 10, COM B
Programmable Input 11.....	IN 11, COM B
Programmable Input 12.....	IN 12, COM B
Programmable Input 13.....	IN 13, COM B
Programmable Input 14.....	IN 14, COM B

Communication Ports

Universal Serial Bus (USB)

Interface	USB type B port
Location.....	Front panel

Terminal Assignments

Watchdog.....	WTCHD1, WTCHD, WTCHD2
Relay Output 1.....	RLY 1, RLY 1
Relay Output 2.....	RLY 2, RLY 2
Relay Output 3.....	RLY 3, RLY 3
Relay Output 4.....	RLY 4, RLY 4
Relay Output 5.....	RLY 5, RLY 5
Relay Output 6.....	RLY 6, RLY 6
Relay Output 7.....	RLY 7, RLY 7
Relay Output 8.....	RLY 8, RLY 8
Relay Output 9.....	RLY 9, RLY 9
Relay Output 10.....	RLY 10, RLY 10
Relay Output 11.....	RLY 11, RLY 11

Field Power Output

Continuous Rating.....	15 Adc (20 Adc up to 55°C (131°F))
Terminals.....	F+, F–

Minimum 10-Second Forcing Output Rating

60 Vac Input.....	50 Vdc, 30 Adc
120 Vac Input.....	100 Vdc, 30 Adc
240 Vac Input.....	200 Vdc, 30 Adc

Minimum Field Resistance

32 Vdc Application.....	2.13 Ω (1.6 Ω for 20 Adc up to 55°C (131°F))
63 Vdc Application.....	4.20 Ω (3.15 Ω for 20 Adc up to 55°C (131°F))
125 Vdc Application.....	8.33 Ω (6.25 Ω for 20 Adc up to 55°C (131°F))

Regulation

In regulation modes that rely upon the monitoring of the generator terminal voltage, the DECS-250 senses and responds to the measured rms voltage.

FCR Operating Mode

Setpoint Range.....	0 to 18 Adc, in increments of 0.1%
Regulation Accuracy.....	$\pm 1.0\%$ of the nominal value for 10% of the power input voltage change or 20% of the field resistance change. Otherwise, $\pm 5.0\%$

FVR Operating Mode

Setpoint Range.....	0 to 270 Vdc, in increments of 0.1%
Regulation Accuracy.....	$\pm 1.0\%$ of the nominal value for 10% of the power input voltage change or 20% of the field resistance change. Otherwise, $\pm 5.0\%$

AVR Operating Mode

Setpoint Range.....	70 to 120% of rated generator voltage, in increments of 0.1%
Regulation Accuracy.....	$\pm 0.25\%$ over load range at rated PF with constant generator frequency and ambient temperature
Steady-State Stability.....	$\pm 0.25\%$ at rated PF with constant generator frequency and ambient temperature
Temperature Drift.....	$\pm 0.5\%$ between 0 and 40°C at constant load and generator frequency

Var Operating Mode

Setpoint Range	–100% (leading) to +100% (lagging) of the generator nominal apparent power in increments of 0.1%
Regulation Accuracy	±2.0% of the nominal generator apparent power rating at the rated generator frequency

Power Factor Operating Mode

Setpoint Range	0.5 to 1.0 (lagging) and –0.5 to -1.0 (leading), in increments of 0.005
Regulation Accuracy	±0.02 PF of the PF setpoint for the real power between 10 and 100% at the rated frequency

Parallel Compensation

Modes.....	Reactive Droop, Line Drop, and Reactive Differential (Cross-Current)
Cross-Current Input Burden	Can exceed 1 VA if external resistors are added to the CT circuit for cross-current compensation
Cross-Current Input Terminals.....	CCCT+, CCCT–

Setpoint Range

Reactive Droop	0 to +30% of Rated Voltage
Line Drop.....	0 to 30% of Rated Voltage
Cross-Current.....	–30 to +30% of Primary CT Current

Generator Protection Functions**Overvoltage (59) and Undervoltage (27)*****Pickup***

Range.....	1 to 600,000 Vac
Increment	1 Vac

Time Delay

Range.....	0.1 to 60 s
Increment	0.1 s

Loss of Sensing***Time Delay***

Range.....	0 to 30 s
Increment	0.1 s

Voltage Balanced Level

Range.....	0 to 100% of Positive Sequence Voltage
Increment	0.1%

Voltage Unbalanced Level

Range.....	0 to 100% of Positive Sequence Voltage
Increment	0.1%

Overfrequency (81O) and Underfrequency (81U)***Pickup***

Range.....	30 to 70 Hz
Increment	0.01 Hz

Time Delay

Time Delay Range 0 to 300 s
 Increment 0.1 s

Voltage Inhibit (81U only)

Range 50 to 100% of Rated Voltage
 Increment 1%

Reverse Power (32R)Pickup

Range 0 to 150% of Rated Watts
 Increment 1%

Time Delay

Range 0 to 300 s
 Increment 0.1 s

Loss of Excitation (40Q)Pickup

Range 0 to 150% of Rated kvars
 Increment 1%

Time Delay

Range 0 to 300 s
 Increment 0.1 s

Field Protection Functions**Field Overvoltage**Pickup

Range 1 to 325 Vdc
 Increment 1 Vdc

Time Delay

Range 0.2 to 30 s
 Increment 0.1 s

Field OvercurrentPickup

Range 0 to 22 Adc
 Increment 0.1 Adc

Time Delay

Range 5 to 60 s
 Increment 0.1 s

Power Input FailurePickup

Single-Phase Source <30 Vac
 Three-Phase Source
 Balanced Phases <50 Vac
 Unbalanced Phases >13 Vac, ± 2.5 Vac difference from phase to phase

Time Delay

Range..... 0 to 10 s
 Increment 0.1 s

Exciter Diode Monitor (EDM)Pole Ratio

Range..... 0 to 10
 Increment 0.01

Pickup Level

Open and Shorted Diode 0 to 100% of Metered Field Current
 Increment 0.1%

Delay

Open Diode Protection..... 10 to 60 s
 Shorted Diode Protection 5 to 30 s
 Increment 0.1 s

Synchronism Check (25) Protection**Voltage Difference**

Range..... 1 to 50%
 Increment 1%

Slip Angle

Range..... 1 to 99°
 Increment 0.1°

Slip Frequency

Range..... 0.01 to 0.5 Hz
 Increment 0.01 Hz

Startup**Soft Start Level**

Range..... 0 to 90% of Rated Gen Voltage
 Increment 1%

Soft Start Time

Range..... 1 to 7,200 s
 Increment 1 s

Field Flash Dropout Level

Range..... 0 to 100% of Rated Gen Voltage
 Increment 1%

Maximum Field Flash Time

Range..... 1 to 50 s
 Increment 1 s

Voltage Matching

Accuracy..... Generator rms voltage is matched with the bus rms voltage to within $\pm 0.5\%$ of the generator voltage.

Power System Stabilizer (Style xPxxxxx)

Model..... IEEE Std 421.5 type PSS2A/2B/2C
 Operating Mode Generator or Motor, ABC or ACB phase sequence
 Sensing Configuration..... Power and Speed or Speed only
 Power Measurement..... Three Wattmeter method

On-Line Overexcitation Limiting

High Current Level

Pickup

Range..... 0 to 40 Adc
 Increment 0.1 Adc

Time

Range..... 0 to 10 s
 Increment 1 s

Medium Current Level

Pickup

Range..... 0 to 30 Adc
 Increment 0.1 Adc

Time

Range..... 0 to 120 s
 Increment 1 s

Low Current Level

Pickup

Range..... 0 to 20 Adc
 Increment 0.1 Adc

Off-Line Overexcitation Limiting

High Current Level

Pickup

Range..... 0 to 40 Adc
 Increment 0.1 Adc

Time

Range: 0 to 10 s
 Increment: 1 s

Low Current Level

Pickup

Range..... 0 to 20 Adc
 Increment 0.1 Adc

Sequence of Events Recording (SER)

Over 1,000 records are stored in nonvolatile memory (retrievable via BESTCOMSPi^{us}®). The SER can be triggered by: Input/Output status changes, system operating status changes, or alarm annunciations.

Data Logging (Oscillography)

Up to 6 variables can be logged. The sampling rate is 1,200 data points per log, up to 1,199 pre-trigger, 4 ms to 10 s intervals, (4.8 s to 12,000 s total log duration).

Environment

Temperature

Operating Range –40 to +70°C (–40 to +158°F)

Storage Range –40 to +85°C (–40 to +185°F)

Humidity

MIL-STD-705B, Method 711-1C

Salt Fog

MIL-STD-810E, Method 509.3

Type Tests

Shock

Withstands 15 G in 3 perpendicular planes.

Vibration

18 to 2,000 Hz 5 G for 8 hours

Impulse

IEC 60255-5

Transients

EN61000-4-4

Static Discharge

EN61000-4-2

HALT (Highly Accelerated Life Testing)

HALT is used by Basler Electric to prove that our products will provide the user with many years of reliable service. HALT subjects the device to extremes in temperature, shock, and vibration to simulate years of operation, but in a much shorter period. HALT allows Basler Electric to evaluate all possible design elements that will add to the life of this device. As an example of some of the extreme testing conditions, the DECS-250 was subjected to temperature tests (tested over a temperature range of –100 to +120°C (–148 to +248°F)), vibration tests (of 5 to 45 G at +20°C (68°F)), and temperature/vibration tests (tested at 40 G over a temperature range of –100 to +120°C (–148 to +248°F)). Combined temperature and vibration testing at these extremes proves that the DECS-250 is expected to provide long-term operation in a rugged environment. Note that the vibration and temperature extremes listed in this paragraph are specific to HALT and do not reflect recommended operation levels.

Patent

Self-Tuning Patent Number: US 2009/0195224 A1

Physical

Dimensions..... Refer to the *Mounting* chapter.

Weight 6.62 kg (14.6 lb)

Regulatory Certifications and Standards

Maritime Recognition

Recognized per standard IACS UR (sections E10 and E22) by the following:

- Bureau Veritas (BV)
- Det Norske Veritas (DNV)
- American Bureau of Shipping (ABS)

IEC 60092-504 used for evaluation.

For current certificates, see www.basler.com.

Grid Code

Component certified per standard VDE-AR-N 4110.

UL Certification

This product is a Recognized Component (cURus) covering the US and Canadian.

UL File (E97035-FPTM2/FPTM8)

Standards used for evaluation:

- UL 6200:2019
- CSA C22.2 No. 14

CSA Certification

This product was tested and has met the certification requirements for electrical, plumbing, and/or mechanical products. CSA Report (2385480)

Standards used for evaluation:

- UL 508
- CSA C22.2 No. 0
- CSA C22.2 No. 14

CE and UKCA Compliance

This product has been evaluated and complies with the relevant essential requirements set forth by the EU legislation and UK Parliament.

EC Directives:

- LVD 2014/35/EU
- EMC 2014/30/EU
- ROHS 2 2011/65/EU

Harmonized standards used for evaluation:

- EN 50178 – Electronic Equipment for use in Power Installations
- EN 50581 – Technical Documentation for the Assessment of Electrical and Electronic Products with Respect to the Restriction of Hazardous Substances.
- EN 61000-6-4 – Electromagnetic Compatibility (EMC), Generic Standards, Emission Standard for Industrial Environments
- EN 61000-6-2 – Electromagnetic Compatibility (EMC), Generic Standards, Immunity for Industrial Environments

China RoHS

The following table serves as the declaration of hazardous substances for China in accordance with PRC standard SJ/T 11364-2014. The EFUP (Environment Friendly Use Period) for this product is 40 years.

PRODUCT:	DECS-250					
零件名称 Part Name	有害物质 Hazardous Substances					
	铅 Lead (Pb)	汞 Mercury (Hg)	镉 Cadmium (Cd)	六价铬 Hexavalent Chromium (Cr ⁶⁺)	多溴联苯 Polybrominated Biphenyls (PBB)	多溴二苯醚 Polybrominated Diphenyl Ethers (PBDE)
金属零件 Metal parts	O	O	O	O	O	O
聚合物 Polymers	O	O	O	O	O	O
电子产品 Electronics	X	O	O	O	O	O
电缆和互连配件 Cables & interconnect accessories	X	O	O	O	O	O
绝缘材料 Insulation material	O	O	O	O	O	O

本表格依据 SJ/T11364 的规定编制。

O: 表示该有害物质在该部件所有均质材料中的含量均在 GB/T 26572 规定的限量要求以下。

X: 表示该有害物质至少在该部件的某一均质材料中的含量超出 GB/T 26572 规定的限量要求。

This form was prepared according to the provisions of standard SJ/T11364.

O: Indicates that the hazardous substance content in all homogenous materials of this part is below the limit specified in standard GB/T 26252.

X: Indicates that the hazardous substance content in at least one of the homogenous materials of this part exceeds the limit specified in standard GB/T 26572.