$25.00

BALDOR®
MOTORS AND DRIVES

AC Servo Drive

DBSC 100 Series
AC Servo Control

Installation and Operating Manual

6/96 **MN1229**

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Section 1
Introduction and Conformity

Introduction

The Baldor Series Controls represent the latest technology in microprocessor based motor controls. The user programmable parameters available in every control provides the ability to customize the control to most any application.

Baldor has tried to ensure that the information in this manual is correct at the time of printing. The information is subject to change without prior notice.

Conformity

This product is only for use in industrial applications as described in EN 60204 and VDE 0160. This means use DBSC100 in stationary ground based applications only. It is a component only and is not intended for immediate use within the meaning of “Safety law of appliance”, “EMC Law” or “Machine directive”. It is the responsibility of the user to verify that the equipment the DBSC 100 is used in complies with all applicable regulations.

The DBSC 100 Series AC Servo Control is intended for use in industrial installations. These controls are designed for applications that require speed control of three phase AC Servo motors.

The DBSC 100 conforms to the following standards:

DIN VDE 0100	Power installations with nominal voltages ≤ 1000 VAC.
DIN VDE 0110	Dimensioning of clearance tolerances.
DIN VDE 0160	Electronic equipment for use in electrical power installations.
DIN IEC 326	Design and use of printed circuit boards.
EN 60529	Degrees of protection provided by enclosure.

Limited Warranty

For a period of one (1) year from the date of original purchase, BALDOR will repair or replace without charge controls which our examination proves to be defective in material or workmanship. This warranty is valid if the unit has not been tampered with by unauthorized persons, misused, abused, or improperly installed and has been used in accordance with the instructions and/or ratings supplied. This warranty is in lieu of any other warranty or guarantee expressed or implied. BALDOR shall not be held responsible for any expense (including installation and removal), inconvenience, or consequential damage, including injury to any person or property caused by items of our manufacture or sale. (Some states do not allow exclusion or limitation of incidental or consequential damages, so the above exclusion may not apply.) In any event, BALDOR's total liability, under all circumstances, shall not exceed the full purchase price of the control. Claims for purchase price refunds, repairs, or replacements must be referred to BALDOR with all pertinent data as to the defect, the date purchased, the task performed by the control, and the problem encountered. No liability is assumed for expendable items such as fuses.

Goods may be returned only with written notification including a BALDOR Return Authorization Number and any return shipments must be prepaid.

Safety Notice

This equipment contains high voltage. Electrical shock can cause serious or fatal injury. Only qualified personnel should attempt the start-up procedure or troubleshoot this equipment.

This equipment may be connected to other machines that have rotating parts or parts that are driven by this equipment. Improper use can cause serious or fatal injury. Only qualified personnel should attempt the start-up procedure or troubleshoot this equipment.

PRECAUTIONS

⚠ **WARNING: Do not touch any circuit board, power device or electrical connection before you first ensure that power has been disconnected and there is no high voltage present from this equipment or other equipment to which it is connected. Electrical shock can cause serious or fatal injury. Only qualified personnel should attempt the start-up procedure or troubleshoot this equipment.**

⚠ **WARNING: Be sure that you are completely familiar with the safe operation of this equipment. This equipment may be connected to other machines that have rotating parts or parts that are controlled by this equipment. Improper use can cause serious or fatal injury. Only qualified personnel should attempt the start-up procedure or troubleshoot this equipment.**

⚠ **WARNING: Be sure all wiring complies with the National Electrical Code and all regional and local codes. Improper wiring may result in unsafe conditions.**

⚠ **WARNING: Be sure the system is properly grounded before applying power. Do not apply AC power before you ensure that all grounding instructions have been followed. Electrical shock can cause serious or fatal injury.**

⚠ **WARNING: Do not remove cover for at least five (5) minutes after AC power is disconnected to allow capacitors to discharge. Dangerous voltages are present inside the equipment. Electrical shock can cause serious or fatal injury.**

⚠ **WARNING: Improper operation of control may cause violent motion of the motor shaft and driven equipment. Be certain that unexpected motor shaft movement will not cause injury to personnel or damage to equipment. Peak torque of several times the rated motor torque can occur during control failure.**

⚠ **WARNING: Motor circuit may have high voltage present whenever AC power is applied, even when motor is not rotating. Electrical shock can cause serious or fatal injury.**

⚠ **Caution: To prevent equipment damage, be certain that the electrical service is not capable of delivering more than the maximum line short circuit current amperes listed in this manual.**

⚠ **Caution: To prevent equipment damage, be certain that the input power has correctly sized protective devices installed as well as a power disconnect.**

⚠ **Caution: To prevent equipment damage, DO NOT connect a 24VDC source to terminal strip X2 if the 24 Volt option is not installed. If you apply 24VDC to X2 without the option, the control will be damaged.**

Section 2
Specifications

Identification

DBSC 1XX - XXX - X

Digital Baldor Servo Control

Series

Code	Current
02	2.5 Amps
05	5 Amps

Code	Input Control Options
A	Pulse & Direction with RS-232
B	Pulse & Direction with RS-422/RS485
E	Electronic Handwheel (Pulse Follower) with RS-232
F	Electronic Handwheel (Pulse Follower) with RS-422/RS485

Code	Feedback Options
A	Standard Resolver
B	Encoder

Code	Field Bus Options
A	None
B	CAN Bus

Code	Input Control Options
Blank	Standard 230 VAC Input Power
1	115 VAC 1Ø Input Power
2	Optional external 24 VDC Logic Input (Customer Provided)
3	115 VAC 1Ø Input Power and External 24 VDC Logic Input

General Specifications - 230VAC

Description	Unit	DBSC102-AAA	DBSC105-AAA
Input Voltage Range (230VAC 1Ø Nominal)	VAC	220 - 250	
Input Frequency	Hz	50/60 ±5%	
Nominal Output Bus (Range)	VDC	320 (50-350)	
Nominal Current (±10%)	A_{RMS}	2.5	5[1]
Peak Phase Current (±10%); 2.5s ± .5s	A_{RMS}	5	10
Nominal Output Power	KVA	1.01	2.17
Efficiency	%	>97	
Minimum Load Inductance	µH	400	
Nominal Switching Frequency	KHz	8.5	
Mounting	–	Panel	
Overall Dimensions	in (mm)	2.65x6.81x6 (67.5x173x152.5)	3.6x6.8x6 (92.5x173x152.5)
Weight	lbs (Kg)	2.73 (1.24) (without heatsink)	4.69 (2.13) (with heatsink)
Operating Altitude	Feet (Meters)	To 3300 feet (1000 meters). Above 3300 ft, derate 11% per 3300ft (1000m).	
Operating Temperature	°C	+5 to 40	
Rated Storage Temperature	°C	–25 to +70	

[1] DBSC 105 with additional heatsink.

All values at ambient temperature of 25°C unless otherwise stated.

General Specifications - 115VAC

Description	Unit	DBSC102-AAA-1	DBSC105-AAA-1
Input Voltage Range (115VAC 1Ø Nominal)	VAC	97 - 125	
Input Frequency	Hz	50/60 ±5%	
Nominal Output Bus (Range)	VDC	320 (50-350)	
Nominal Current (±10%)	A_{RMS}	2.5	5[1]
Peak Phase Current (±10%); 2.5s ± .5s	A_{RMS}	5	10
Nominal Output Power	KVA	1.01	2.17
Efficiency	%	>97	
Minimum Load Inductance	µH	400	
Nominal Switching Frequency	KHz	8.5	
Mounting	–	Panel	
Overall Dimensions	in (mm)	2.65x6.81x6 (67.5x173x152.5)	3.6x6.8x6 (92.5x173x152.5)
Weight	lbs (Kg)	2.73 (1.24) (without heatsink)	4.69 (2.13) (with heatsink)
Operating Altitude	Feet (Meters)	To 3300 feet (1000 meters). Above 3300 ft, derate 11% per 3300ft (1000m).	
Operating Temperature	°C	+5°C to 40°C	
Rated Storage Temperature	°C	–25°C to +70°C	

[1] DBSC 105 with additional heatsink.

All values at ambient temperature of 25°C unless otherwise stated.

Signal Levels

Description	Unit	DBSC 102	DBSC 105
Command Input	VDC	±10	
Command Signal Resolution	bits	12	
A/D Conversion Rate	µsec	476	
Control Inputs - X3-6, X3-7, X3-9, X3-10, X3-11, X3-12, X3-13, X3-16, X3-17	VDC	+12 to +29	
Feedback System	–	Resolver	
Feedback Resolution Velocity ≤1500 RPM Velocity ≤6000 RPM Velocity > 6000 RPM	bits	16 14 12	
Resolver Pole Paris	–	1	
Resolver Winding Ratio		0.5	
Encoder Output	–	RS422	
Encoder Resolution	ppr	512 / 1024[1] / 2048 / 4096	
Pulse & Direction Input	–	RS422 (Galvanically Isolated)	
Maximum Input Frequency	KHz	500	
Optional Handwheel Input (Pulse Follower)	–	RS422 (Encoder interface - A & B)	
Maximum Input Frequency	KHz	500	
Communications Interfaces	–	RS232 / 422 / 485 (Not galvanically Isolated)	
Data Communications Rate	Baud	9600 (Fixed)	

[1] Factory Setting.

Regeneration

Description	Unit	DBSC 102	DBSC 105
Maximum REGEN Switching Current	A	7	
Maximum Load Inductance	μH	100	
REGEN Resistor for DBSC 10X-AAA (230VAC)	–	RG56	
REGEN Resistor for DBSC 10X-AAA-1 (115VAC)	–	RG27	
Continuous REGEN Power with 230VAC (115VAC) Input Voltage	Watts	44	
REGEN Power	Watt-Sec	430	

Operating Conditions

Description	Unit	DBSC 102	DBSC 105
Ambient Operating Temperature	°C	+5 to 40	
Humidity	%	10 to 90 RH Non-Condensing (According to DIN40 040, class F)	
Altitude	m	1000	
Shock	–	10G (DIN IEC 68-2-6/29)	
Vibration	–	1G (DIN IEC 68-2-6/29)	
Class of Protection	–	IP20 (DIN40 050/ IEC 144	

Optional 24VDC Input (Optional - Must be ordered separately)

Description	Unit	DBSC 102	DBSC 105
Input Voltage Range	VDC	20 to 30	
Input Ripple Voltage	%	±10	
Input Current (@24VDC)	A_{RMS}	1.75	
Surge Current (at Power On for ≤100msec)	A_{RMS}	4	
DC Bus Voltage absolute Min (Max) values with 24V option	VDC	0 (350)	

Section 3
Installation

Overview

This section describes the proper mounting and wiring procedure for the Baldor Series DBSC 100 AC Servo Control. If problems arise after installation, please refer to the Diagnostics and Troubleshooting section of this manual.

Location and Mounting

⚠ **CAUTION: Avoid locating control immediately above or beside heat generating equipment, or directly below water or steam pipes.**

⚠ **CAUTION: Avoid locating control in the vicinity of corrosive substances or vapors, metal particles and dust.**

Select a mounting surface for the control that will allow the control to be mounted in a vertical position (with connector X1 at the top) using the mounting hole(s) provided. Mounting hole location is shown in Section 6 of this manual. The area selected should allow air to freely circulate around the control. This is very important to maintain proper heat dissipation. Provide at least six inches of clearance top and bottom for maximum cooling efficiency.

Refer to the Section 6 Mounting Hole Location diagram and locate and drill the mounting hole(s) and mount the control.

Altitude Derating

Control ratings apply to 3300 feet (1000 meters) altitude without derating required. For installations at higher altitudes derate the continuous and peak output currents of the control by 11% for each 3300 feet (1000 meters) above 3300 feet.

Temperature Derating

Control ratings apply from 5°C to 40°C. Maximum ambient temperature is 40°C.

Overload Protection

Baldor Controls feature UL approved motor overload protection suitable for motors that consume at least 50% of the output rating of the control. Other governing agencies such as NEC (National Electric Code) may require separate over current protection. The installer of this equipment is responsible for complying with NEC guidelines and CE directives (Conformite Europeene) and applicable local codes that govern wiring protection, grounding, disconnects and other current protection.

Wiring Consideration

All logic and control connections are made at the connectors shown in Figure 3-1. All external wires for the control should be run in a conduit that is separate from power wiring. The use of shielded wire is recommended for all control wiring.

Protective Devices

Be sure a suitable input power protection device is installed.

Slow Blow Fuse: Each DBSC must be fused separately. Recommended fuse rating is determined as follows:
$I_{fuse} = 1.25 \times I_{nominal}$

Power Disconnect

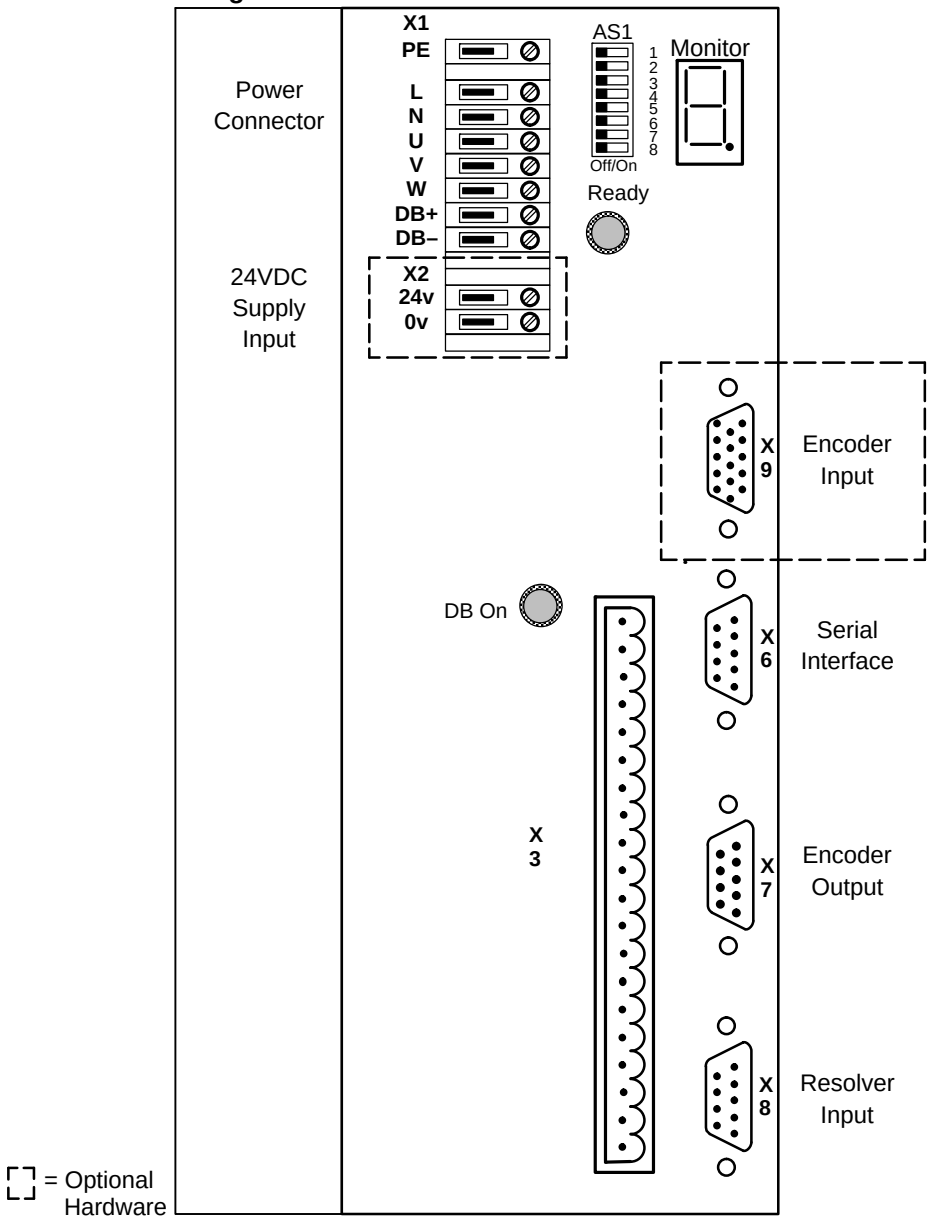
A power disconnect should be installed between the input power source and the DBSC for a fail safe method to disconnect power. The control will remain in a powered-up condition until all input power is removed from the control and the internal bus voltage has depleted.

AC Power Connections

Figure 3-1 shows the connector locations.

1. Connect the incoming AC power wires from the protection devices as follows:
   Line 1 to connector X1 pin 2 (label “L”).
   Line 2 to connector X1 pin 3 (label “N”).
2. Connect earth ground to X1 pin 1 (labeled “PE”) of the control. Be sure to comply with local codes.

Figure 3-1 DBSC 100 Connector Locations



Motor Wiring

Connect the motor leads as follows:

1. Connect motor phase U to X1-U.
2. Connect motor phase V to X1-V.
3. Connect motor phase W to X1-W.

Control Signal Wiring

All wiring from external devices to the control are made at the connectors shown in Figure 3-1.

The inputs at X3 pins 7, 9, 10, 11 and 12 can be wired for active high or active low conditions. Pin 7 is the CREF (Control Input Reference) point.

Active High Definition

If the Control Inputs are to be wired as Active High, CREF is connected to GND. When a control input is at +24VDC (range +12VDC to +29VDC), it is active and when it is at GND it is inactive. Figure 3-2 shows this relationship.

Active Low Definition

If the Control Inputs are to be wired as Active Low, CREF is connected to +24VDC (range +12VDC to +29VDC). When a control input is at GND, it is active and when it is at +24VDC it is inactive. Figure 3-2 shows this relationship.

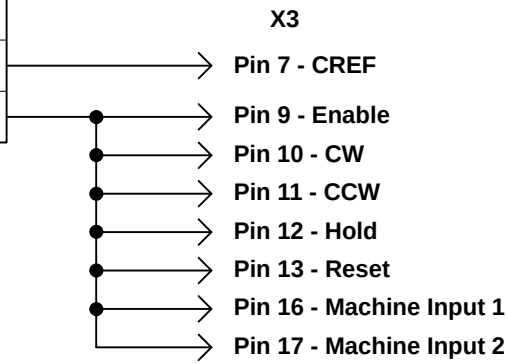
Table 3-1 Control Inputs

Signal	Connector	Active Condition	Inactive Condition
Enable	X3-9	Control Enable	Control Disabled
CW Limit	X3-10	CW Rotation Enabled	CW Rotation Disabled
CCW Limit	X3-11	CCW Rotation Enabled	CCW Rotation Disabled
Hold	X3-12	Hold function is Active	Hold function is not active

Control Signal Wiring Continued

Figure 3-2 Active HIGH/LOW Relationship

Active Low	Active High
GND_{ext} (Sink)	V_{ext} (Source)
+24VDC	GND
GND	+24VDC



Note: These pins are shown wired together. Although this can be done, each input is usually connected to a switch for individual control of each input condition. Pins 16 and 17 are optional inputs and are described later in this section.

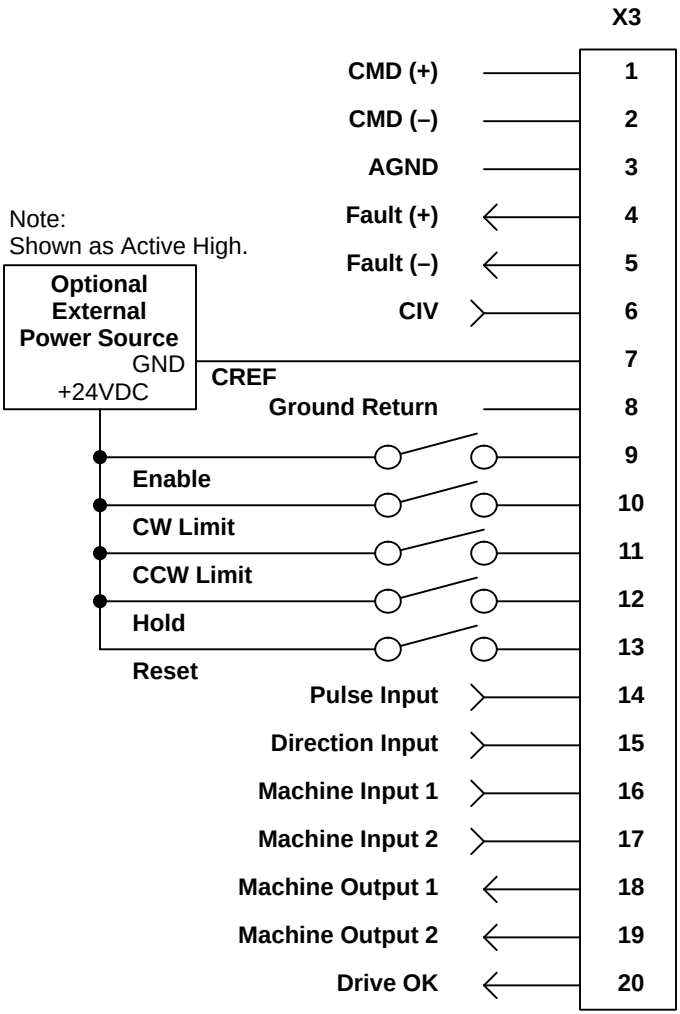
A typical wiring control diagram is shown in Figure 3-3.

1. Connect the CREF signal wire to X3-7.
2. Connect the Enable signal wire to X3-9.
3. Connect the CW Limit signal wire to X3-10.
4. Connect the CCW Limit signal wire to X3-11.
5. Connect the Hold signal wire to X3-12 (optional).
6. Connect the Reset (Fault Reset) signal wire to X3-13 (optional).

The Reset signal (Fault Reset) can only reset the following fault types: Over voltage, Under voltage, Resolver fault, or Control Temperature fault.

Note: Current input for each control input X3-9 to X3-17 is I_{in}=10mA maximum (for each input).

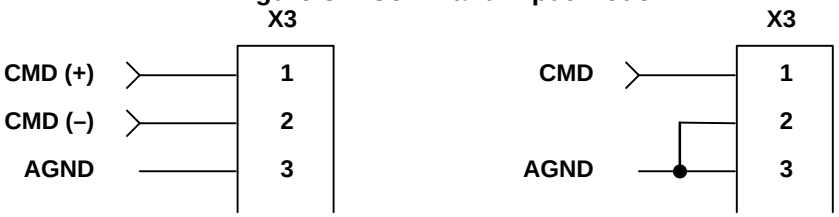
Figure 3-3 Wiring Control Diagram (X3)



Command Input

The Analog Input at X3 pins 1, 2, and 3 can be wired for single ended or differential input operation. Figure 3-4 shows these configurations.

Figure 3-4 Command Input Mode



Differential Input **Single Ended Input**

1. Determine if your application requires Single Ended Input (Step 2) or Differential Input (Step 3) Command Signal wiring.
2. For Single Ended Input wiring:
   A. Connect the CMD input wire to X3-1.
   B. Connect the command common (analog ground) wire to X3-3.
   C. Connect a jumper wire from X1-3 to X1-2.
3. For Differential Input wiring:
   D. Connect the CMD (+) input wire to X3-1.
   E. Connect the CMD (–) input wire to X3-2.
   F. Connect the command common (analog ground) wire to X3-3.

REGEN Resistor

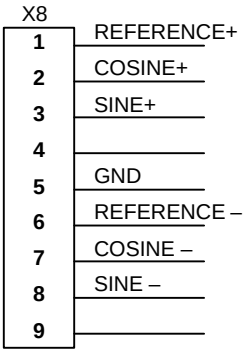
If the motor is connected to a large inertia load that may require rapid deceleration, an external REGEN resistor must be installed as follows:

1. Connect one wire from the REGEN Resistor to connector X1-7.
2. Connect the other wire from the REGEN Resistor to connector X1-8.

Resolver Wiring

The Resolver interface DB-9 connector is X8 on the DBSC control. Figure 3-5 shows the connector pin numbers and signal names. Use twisted pair shielded cable with an insulated overall shield.

Figure 3-5 Resolver Interface

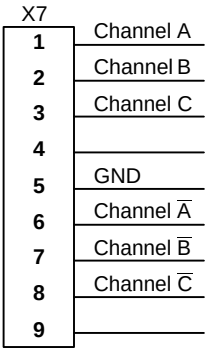


1. Connect the Reference + to X8-1 and Reference – to X8-6.
2. Connect Cosine + to X8-2 and Cosine – to X8-7.
3. Connect Sine + to X8-3 and Sine – to X8-8.
4. Connect the Analog Ground wire to X8-5.

Encoder Output

The encoder output provides position information to the host position controller. Use twisted pair shielded cable with an insulated overall shield. Connect the Encoder Output signals to the positioner as follows: (See Figure 3-6).

Figure 3-6 Encoder Output



1. Connect the Channel A to X7-1 and Channel $\overline{A}$ to X7-6.
2. Connect the Channel B to X7-2 and Channel $\overline{B}$ to X7-7.
3. Connect the Channel C to X7-3 and Channel $\overline{C}$ to X7-8.
4. Connect the GND to X7-5.

The encoder resolution must be set as described in the software manual.

Serial Interface Wiring

Serial Interface

The Serial interface (DB9 connector X6) is used for communication with a PC (Personal Computer) or other equipment.

RS232 - Not available in model DBSC 10X-BXX.

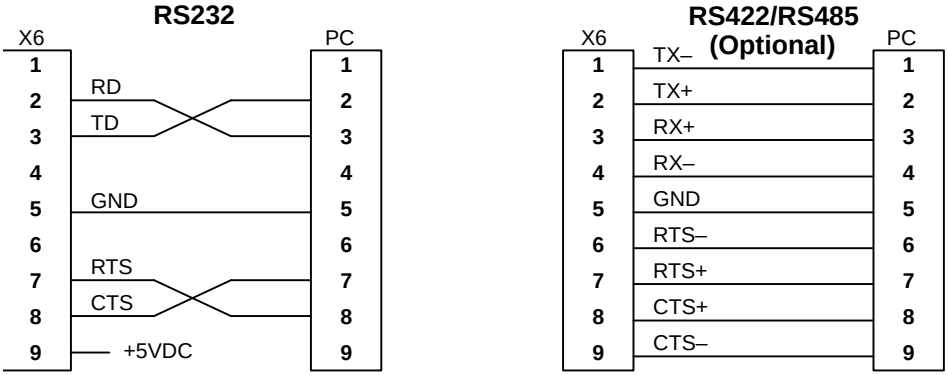
For the RS232 interface, a standard shielded modem cable can be used for connection to a PC. If the cable is straight through (pin to pin), a null modem connector must be used.

These are the only RS232 signals supported by the DBSC control. Mode is jumper selectable as described in Section 4 of this manual.

RS422/RS485 - Not available in model DBSC 10X-AXX.

RS422/RS485 is a factory installed and jumper selectable in models DBSC 10X-EXX and DBSC 10X-FXX. Mode is jumper selectable as described in Section 4 of this manual.

Figure 3-7 RS232 Interface



Note: The +5VDC at X6-9 can be used to power hand held display terminals. Maximum rating of this power source is +5VDC at 350mA.

Optional Control Signal Wiring

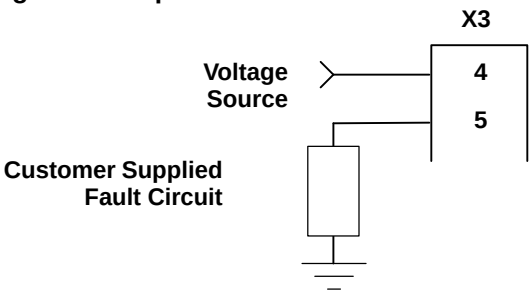
Fault Relay Output (Optional)

A normally closed relay contact is provided at X3-4 and X3-5. This contact can be used to drive an external fault indicator circuit to indicate a fault condition has occurred. If a fault occurs the fault must be reset (X3-13). Wire the optional external fault indicator circuit as follows: (see Figure 3-8).

1. Connect a voltage source to X3-4. (115VAC @ 0.3A **or** +24VDC @ 0.8A).
2. Connect the relay or circuit load to X3-5.

When a fault occurs, the internal N.C. contact will open and de-energize the Fault Circuit.

Figure 3-8 Optional External Fault Indicator



24VDC External Power Source (Optional)

⚠ **Caution: To prevent equipment damage, DO NOT connect a 24VDC source to terminal strip X2 if the 24 Volt option is not installed. If you apply 24VDC to X2 without the option, damage to the control will result. Refer to Section 2 of this manual to identify the model number and determine if the option is installed.**

An external 24 VDC power source can be used as a battery backup feature if the 24VDC option is installed. This may be identified by the catalog number. If AC power is lost, the DBSC control circuits are still active.
Connect the external source to connector X2 as follows:

1. Connect the + (Positive) lead to X2-24V.
2. Connect the – (Negative) lead to X2-0V.

Control Inputs (Optional)

These control inputs are optional. Their reference (common) is CREF at X3-7 (see Figure 3-3). The voltage range is +12VDC to +29VDC for these inputs. They may be used by a PLC or other signal source within your application.

1. Connect the Machine Input 1 (MAI1) signal to X3-16.
2. Connect the Machine Input 2 (MAI2) signal to X3-17.

These inputs are galvanically isolated. Their reference (common) is CGND at X3-8 of Figure 3-3.

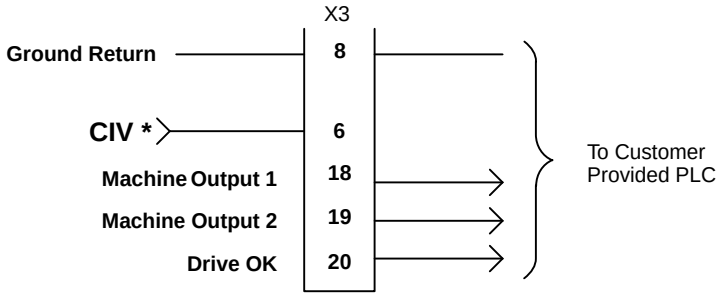
3. Connect the Pulse Input signal to X3-14.
4. Connect the Direction Input signal to X3-15.

Control Outputs (Optional)

Four Opto Isolated outputs are available for “Active Low” (Sink) use. Connect one or more of the control outputs as follows: (see in Figure 3-9).

1. Connect the Ground Return of the power source to X3-8.
2. Connect a customer provided +24VDC source (range = +12VDC to +29VDC) to X3-6 the CIV input (Customer Input Voltage).
3. Connect Machine Output 1 (MAO1) X3-18 to PLC.
4. Connect Machine Output 2 (MAO2) X3-19 to PLC.
5. Connect the Drive OK load to X3-20.

Figure 3-9 Optional Control Outputs



***** 24VDC nominal at 100mA minimum.

Note: These outputs are programmable. Refer to software setup manual for further details.

Electronic Handwheel (Optional)

The electronic handwheel (pulse follower) is an optional connection that allows the control to follow the pulses from an encoder input. This is a factory installed option and must be ordered with the control. This wiring must be separated from power wiring. Separate encoder cable by at least 3″ from parallel runs of power wires. Cross power wires at right angles only.

Cable Preparation

Encoder wiring must be shielded twisted pairs, #22 AWG (0.34mm^2) minimum size, 200′ (61m) maximum, with an insulated overall shield.

DBSC Control End (See Figure 3-10.)

1. Strip the outside jacket approximately 0.375″ (9.5mm) from the end.
2. Solder a #22 AWG (0.34mm^2) wire to the braided shield. Carol cable has a clear Mylar sleeve between the braided shield and the wire bundle. Belden cable does not have a Mylar sleeve.
3. Connect all shields to X9-13. To do this, solder a “Drain Wire” from each shield to the wire soldered to the braided shield in step 2.
4. Insulate or tape off ungrounded end of shields to prevent contact with other conductors or ground.

Encoder End

1. Strip the outside jacket approximately 0.375″ (9.5mm) from the end.
2. Identify each of the four twisted pair and label or use the color codes shown in Figure 3-10.
3. Insulate or tape off ungrounded end of shields and unused conductors to prevent contact with other conductors or ground.

⚠ **CAUTION: Do not connect any shields to the encoder case or motor frame. Do not connect any shields to ground or another power supply or damage to the control may result.**

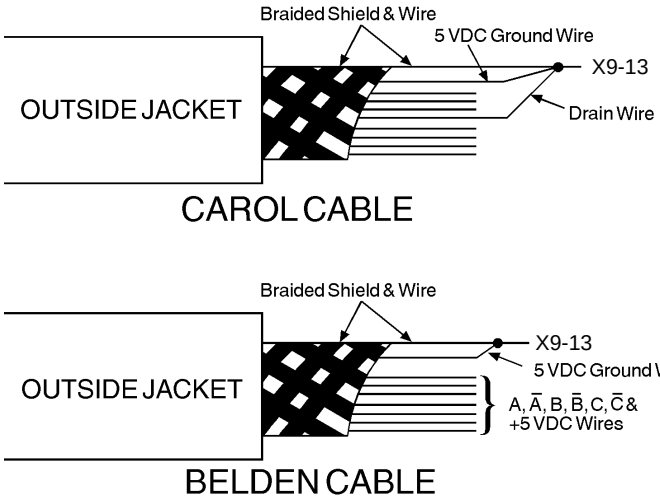
Cable Connection

1. Differential Connections Only
   Connect the cable Braided Shield to DBSC control connector X9-13.

Signal Name	X9 Connector
Channel A	X9-1 (A)
Channel A	X9-6 ($\overline{A}$)
Channel B	X9-2 (B)
Channel B	X9-7 ($\overline{B}$)
Channel C	X9-3 C
Channel C	X9-8 $\overline{C}$
Encoder Supply +5VDC	X9-11
Ground Return	X9-13

2. Single Ended Connections Only
   Differential inputs are recommended for best noise immunity. If only single ended encoder signals are available, connect them to A, B, and C (X9-1, X9-2 and X9-3 respectively).

Figure 3-10 Encoder Cables



Section 4
System Setup

Overview

The system setup section assumes that all wiring has been completed. If not, refer to Section 3 of this manual and complete all wiring for the options you have. It is also assumed that all power is still OFF. Be sure the DIP switch AS1 located on the DBSC panel (Figure 3-1) is properly set. Then perform the jumper settings and power up testing.

DIP Switch Settings

The top 4 switches (1-4) set the card address as shown in Table 4-1. The "OFF" position (to the left) represents a "0" indicated in the table. The "ON" position (to the right) represents a "1" indicated in the table.

For example, if the card address is 3, Table 4-1 indicates the switch settings should be AS1-1=1, AS1-2=1, AS1-3=0, and AS1-4=0.

This means AS1-1 and AS1-2 should be in the ON (right most) position, and switches AS3 and AS4 should be OFF (left most position).

1. Place switch AS1-1 in the correct position.
2. Place switch AS1-2 in the correct position.
3. Place switch AS1-3 in the correct position.
4. Place switch AS1-4 in the correct position.

Table 4-1 Setting Card Address

AS1-1	AS1-2	AS1-3	AS1-4	Card-Address (Hexadecimal)
0	0	0	0	0
1	0	0	0	1
0	1	0	0	2
1	1	0	0	3
0	0	1	0	4

DIP Switch Settings Continued

The top 4 switches allow communications with up to 16 different DBSC controls. The PC software program allows selection of each individual control for monitoring or configuration changes.

The bottom 4 switches (5-8) have the purpose shown in Table 4-2.

Table 4-2 Control Configuration

Switch	Function	Switch-Position	
		ON	OFF
AS1-5	No Function	–	–
AS1-6	Hold-Position	Hold-Position is Active	Hold-Position is inactive
AS1-7	Automatic Offset tuning	Automatic offset tuning is active	Automatic offset tuning is inactive
AS1-8	Enable	Control is Enabled (Active)	Control is Disabled (inactive)

1. Switch AS1-5 has no function. It may be placed in either position.
2. Place switch AS1-6 in the correct position. (Applicable only in the Velocity mode). In the ON position, the motor will quickly decelerate to zero velocity and hold position. This can also be accomplished by activating the HOLD switch at connector pin X3-12 or software command.
3. Place switch AS1-7 in the correct position. In the ON position, automatic offset tuning will be performed as soon as the control is “Disabled” (switch AS1-8 OFF). This is done one time only, during initial setup. AS1-7 is normally in the OFF position during operation.

Note: Place AS1-7 in the OFF position before placing AS1-8 in the ON position.

4. Place switch AS1-8 in the correct position.
   This can also be accomplished by activating the ENABLE switch at connector pin X3-9 or software command.

Jumper Settings

Note: RS-232 is not available for model DBSC 10X-BXX.

Note: RS422/485 is not available for model DBSC 10X-AXX.

Determine the desired mode of operation. Refer to Table 4-3 and determine the correct jumper positions for that mode.

Table 4-3 Jumper Setting Configuration

Jumpers	Function	Jumper Position	Option
SB 601-609	RS232	1-2	Axx***** / Exx***** / Fxx
SB 601-609	RS422 or 485	2-3	Bxx***** / Exx / Fxx*****

***** Indicates factory jumper setting.

1. Remove the DBSC cover to gain access to the jumpers.
2. For RS232 mode, check that jumpers SB 601-609 are at pins 1-2.
3. For RS422/485 mode, check that jumpers SB 601-609 are at pins 3-4.
4. Reinstall the cover.

Power Up

Several assumptions are made. These assumptions are:

1. The system setup section assumes that all wiring has been completed.
2. All power is still OFF.
3. The DIP switch AS1 located on the DBSC panel (Figure 3-1) is properly set.
4. The jumper at SB 601-609 is correctly set.

First Time Power Up

The following procedure is for the first time power up condition.

1. Disconnect the motor leads from X1-U, X1-V and X1-W. The initial adjustments must be performed under a no load condition.
2. Control must be disabled (X3-9 input, Figure 3-3 switch OPEN or AS1-8 must be in the OFF position).
3. Measure the input line voltage at the power disconnect device and ensure that it is the correct voltage.
4. Be sure a PC is connected to the serial communications interface (X6).
5. Install the software program on the PC hard disk drive as instructed in the Software Manual.
6. Turn ON the input power to the control.

Power Up Continued

7. When power is applied, the “Monitor” 7 segment display will display a five (5) character succession:

   A. Blank

   B. 8

   C. 2

   D.

0	DBSC 10X-AAA
1	DBSC 10X-BAA
2	DBSC 10X-EAA or FAA

   E. d (Indicates the control is disabled).
   (Decimal point must be off to indicate control is disabled).

   This indicates normal microprocessor test sequence. If the sequence ended abnormally or the decimal point is ON, refer to the troubleshooting section of this manual.

8. If the “Ready” LED is green and ON, and the “Monitor” display shows the letter d the control is ready to be configured using the software program. Refer to the Software Manual for software configuration program operation.

   When the control is properly configured, continue with step 9.

9. Turn OFF the input power to the control.

10. Connect the motor leads X1-U, X1-V and X1-W. Refer to the Motor Wiring procedure in Section 3 of this manual.

The control is now ready for operation.

Section 5
Troubleshooting

Overview

The system troubleshooting procedures involves observing the status of the “Ready” LED, the “DB On” LED and the “Monitor” 7 segment display. The tables in this section provide information related to the indications provided by these devices.

Note: The “Ready” LED can display either RED or GREEN color.

Table 5–1 Operating Mode Indications

Ready	Monitor	Status	Cause
OFF	OFF	Control Disabled	No Fault.
Green	Decimal Point	Control Enabled	Normal operating mode. No Fault.
Red	1	Over-voltage fault (DC Bus)	Missing or wrong REGEN resistor. Input voltage too high.
Red	3	Over-current fault. (More than 2X peak current)	Motor leads shorted or control failure.
Red	4	Over or Under-voltage fault.	Internal 15VDC supply fault.
Red	5	Resolver fault.	Resolver or cable short circuit or not plugged in.
Red	6	Electronic fusing (also see fault 7)	Control or motor current over-load detected by software.
Red	7	I^2t limit reached. After a fault is detected, control will run at nominal output current for 2.5 seconds then stop. The Monitor will display “6” fault. Motor Over-Temperature Control Over-Temperature	Cycle time between Acceleration and Deceleration is too short. Motor overloaded. Control should be relocated to cooler area. Add fans or air conditioning to control cabinet.
Red	9	EEPROM fault.	Reset control.

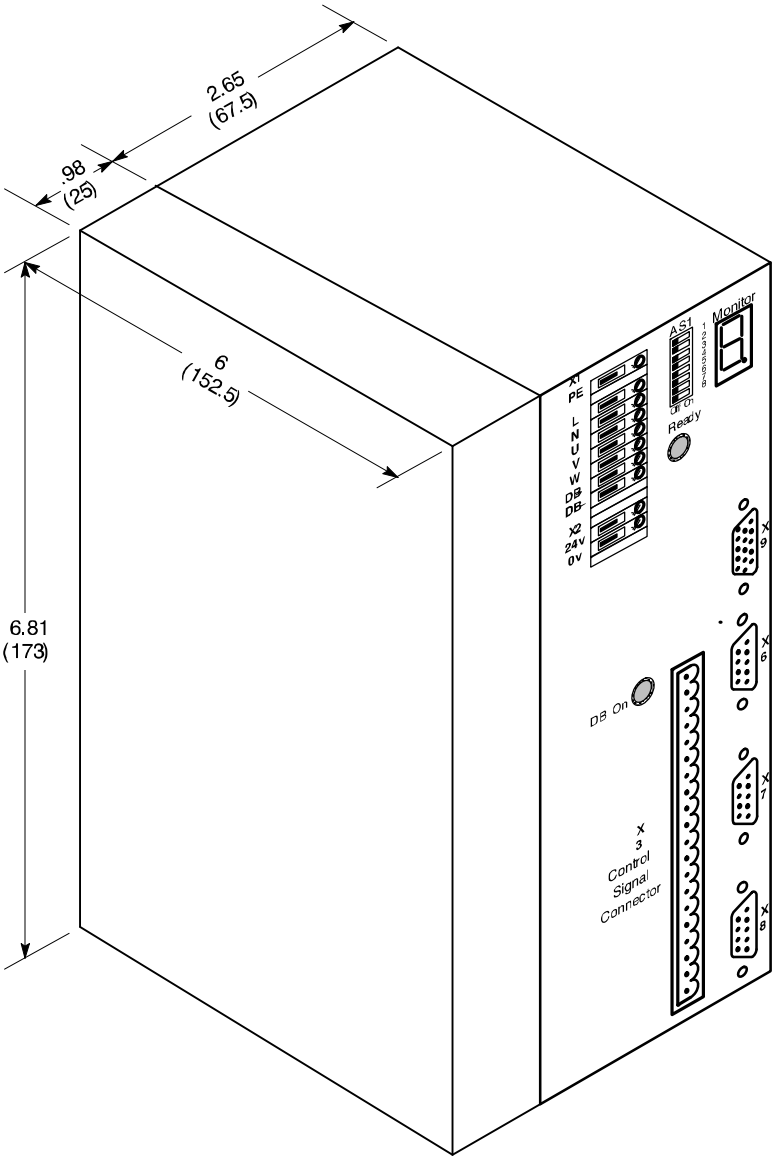
Table 5–1 Operating Mode Indications Continued

Ready	Monitor	Status	Cause
Red	L	Both limit switches active.	Defective or missing limit switch or wiring.
Green	H	Hold-Position mode.	Hold mode activated by hardware or software.
Green	d	Control Disabled.	Disable mode activated by hardware or software.
Red	U	EEPROM fault.	Reset control.
Green	J	Jog mode.	Jog mode activated by hardware or software.
Green	-I	CW limit switch activated.	CW limit reached by load.
Green	I-	CCW limit switch activated.	CCW limit reached by load.

DB LED

The DB LED is on whenever REGEN power is dissipated into the the optional REGEN resistor.

DBSC Dimensions



DBSC 100 Connector Descriptions

X1 - Power Connector

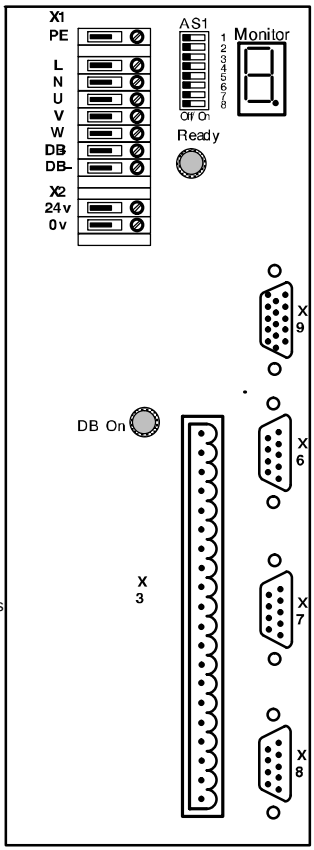
1	Earth	
2	L	Input Power
3	N	
4	U	
5	V	Motor
6	W	
7	DB+	REGEN Resistor
8	DB–	

X2 - Optional Logic Supply

1	+24VDC
2	Common

X3 - Input/Output Signals

1	CMD+	Input Command
2	CMD–	
3	AGND	Analog Ground
4	Fault+	Output
5	Fault–	
6	CIV	User Input Voltage
7	CREF	Control Input Ref.
8	CGND	
9	ENABLE	Enable Input
10	CW	Limit Switch Inputs
11	CCW	
12	HOLD	
13	RESET	Fault Reset
14	PULSE	Input
15	DIRECTION	
16	MAI1	Machine Inputs
17	MAI2	
18	MAO1	Machine Outputs
19	MAO2	
20	DRIVE OK	



X9 - Optional Encoder Feedback

1	CHA - Channel A
2	CHB - Channel B
3	CHC - Channel C
4	SYNC - U
5	SYNC - U/
6	CHA/
7	CHB/
8	CHC/
9	SYNC - W
10	SYNC - V
11	+5V
12	No Connection
13	DGND
14	SYNC - W/
15	SYNC - V/

X6 - Interface

1	No Connection
2	RXD
3	TXD
4	DTR
5	DGND
6	DSR
7	RTS
8	CTS
9	+5V

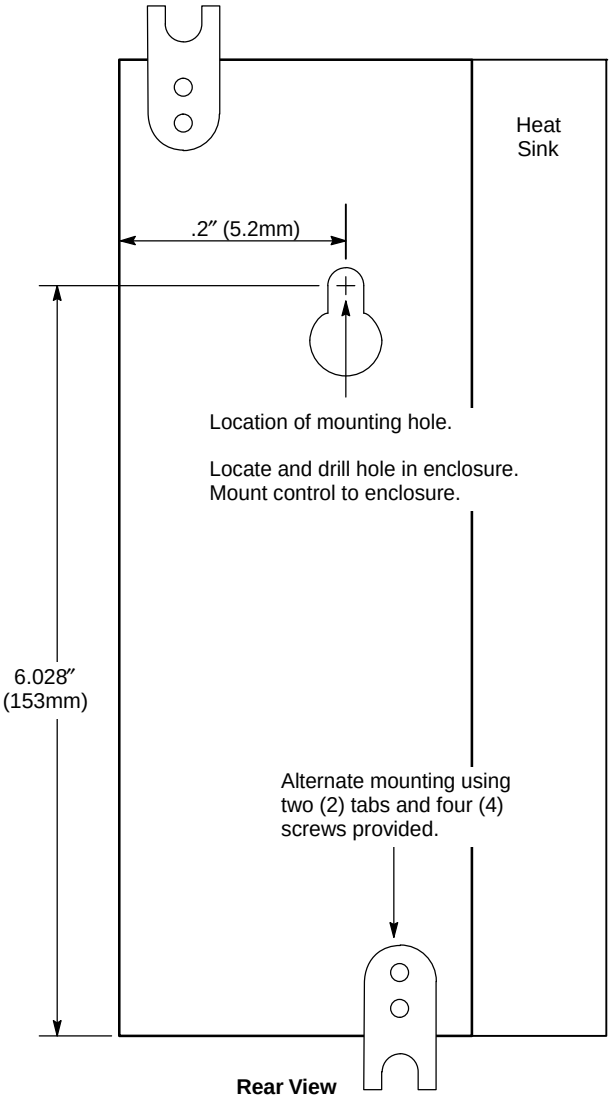
X7 - Encoder Output

1	CHA - Channel A
2	CHB - Channel B
3	CHC - Channel C
4	No Connection
5	DGND
6	CHA/
7	CHB/
8	CHC/
9	No Connection

X8 - Resolver Output

1	Reference +
2	Cosine +
3	Sine +
4	No Connection
5	AGND
6	Reference –
7	Cosine –
8	Sine –
9	No Connection

Mounting Hole Location



BALDOR ELECTRIC COMPANY
P.O. Box 2400
Fort Smith, AR 72902–2400
(501) 646–4711
Fax (501) 648–5792

MN1229

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