ISB

RBPC – Resolver Based Press Control

Installation Manual

Complementary to the RBPC User's Manual

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Table of contents

This installation manual is a complement to the RBPC User's manual. Please read both documents carefully before installing and using the RBPC

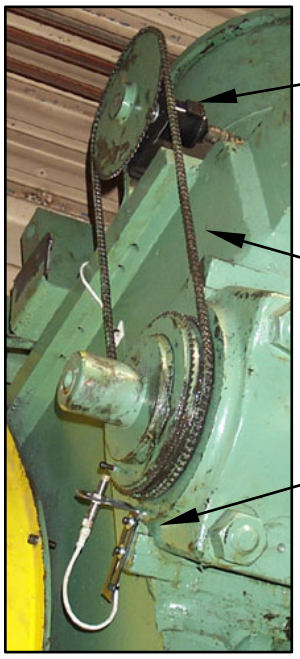
1 Installation Procedure

⚠ IMPORTANT

Before applying power to the control, make sure that the following is connected:

- ✔ Resolver and proximity switch
- ✔ J6-9 Top stop switch
- ✔ J7-4 Aux top stop
- ✔ J7-5 Aux E-Stop stop
- ✔ J3-1 Safety light curtain input
- ✔ J3-2 Emergency stop input

The control has to see these inputs, otherwise faults will be generated and the setup process will take more time.



RESOLVER

Resolver mounted with a chain and sprocket from the existing cam shaft. A resolver spring bracket must be used to avoid damaging the resolver due to improper axial load.

RESOLVER CHAIN LINK

PROXIMITY SWITCH AND MOUNTING BRACKET

The proximity switch is mounted so that it is directly actuated by the cam of the press. The proximity has to be mounted so that it is activated when the machine is a the top dead centre.

STEP1: The first step is to cut out the area for the control

STEP2: Mount the resolver with the spring bracket, the proximity switch and the RBPC.

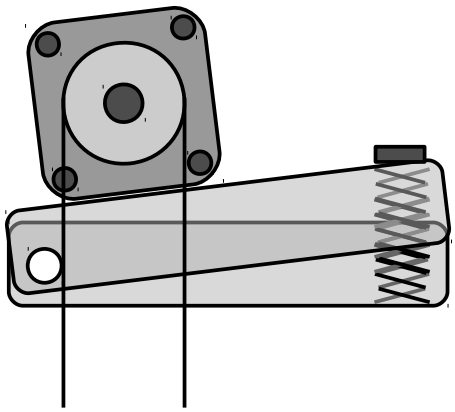
STEP3: Wire the RBPC as per the included wiring diagram

STEP4: Put the mode key-switch in PROG position

STEP5: Clear all the faults on screen (see section 2.6)

STEP 6: Once the control states “Press EXIT to Conf.” in the fourth line of the display, then proceed.

STEP 7: Now the resolver offset must be programmed. Refer to the *Resolver Settings* section of the RBPC User's Manual for step-by-step instructions.



Mount the resolver on the spring bracket as shown in the drawing.
When the chain link is in place, the bracket should be compressed half way in. This will provide proper load absorption and will allow an easy removal of the chain if required.

2 Installation tips

2.1 Front panel mounting

The Front Panel Mounting unit has a sealed front plate and is provided with four #10-32 bolts for mounting. #10-32 nuts are required to secure the panel.

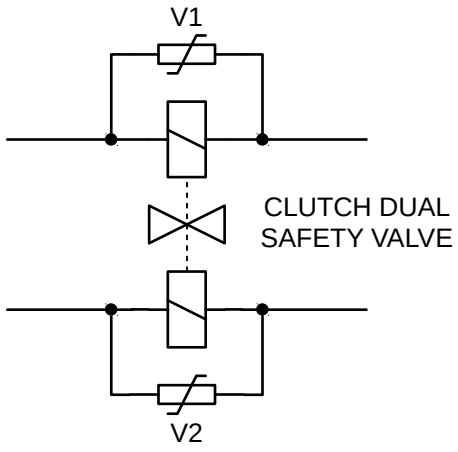
2.2 Heat considerations

The installation enclosure for the RBPC should be at least 76 mm (3”) deep and have a minimum of 50 mm (2”) clearance on all sides. No heat producing control or hardware should be mounted directly underneath the RBPC.

2.3 Wiring guidelines

- The RBPC must be powered from a dedicated 120 V AC line with an appropriate fuse and power switch.
- Do not wire any other devices in series with with the AC power input of the RBPC (J3-3), such as air or oil pressure switches, counterbalance, die block or any other monitoring switches.
- If other shut-off monitoring devices like those mentioned above are required, they should be wired in line with the E-Stop monitoring input of the RBPC (J3-2.).
- The light curtain input (J3-1) and E-stop input (J3-2) of the RBPC are not safety-related and can only be used for monitoring purposes.
- Do not install 12 V or 24 V wiring in the same conduits or raceways as the machine high voltage wiring, including motor wiring.
- Connect all the inputs, outputs, resolver and proximity switches before applying power.
- Appropriate transient suppressor devices must be connected (in parallel) to each solenoid of the clutch safety valve and as close as possible to the solenoid terminals (see V1 & V2 in figure below). Suitable suppressor devices can be ordered from ISB (e.g. P/N 56000502).

Figure 1: Connection of transient suppressor devices



2.4 Grounding essentials

A proper grounding is essential to the RBPC operation. Please observe the following grounding guidelines when wiring the RBPC:

- Use a thick grounding wire to connect the chassis GND terminal of the RBPC to the earth ground point in the control panel.
- The enclosure itself should have a *good* earth ground connection. A separate 1.5 mm^2 (16 AWG) or thicker ground wire is essential.
- A star washer should be used together with a mounting bolt to ensure a good electrical connection between the RBPC chassis and the enclosure.
- Before finishing the installation, measure the electrical reistance of the ground wiring to ensure that it complies with the local electrical codes and regulations.

2.5 Noise considerations

All motor starters, contactors or any other inductive or noise generating devices should be mounted in either a separate control panel or in a separate section of the RBPC enclosure, at least 305 mm (12”) away.

When the RBPC is mounted in an enclosure or a control panel, use separate conduit entrances for low voltage wiring and 120 V AC wiring.

2.6 Understanding the fault messages (what to do?)

The faults in the RBPC are generated one at a time. If a fault occurs, the fault has to be corrected first and then it has to be reset on the main screen. The faults are generated and stored like a deck of cards, one on top of another. If multiple faults have occurred then once the first fault is cleared the next one will appear instantly after the first. All errors are saved in memory. If a power down occurs those same faults will re-appear the next time the control powers up. Please refer to Appendix 1 in the RBPC User’s Manual for a detailed listing and explanation of all faults messages.

2.7 PLS Outputs

In order to cover a wider range of applications with the standard configuration, the PLS outputs of the RBPC are factory equipped with general purpose electromechanical relays. However, it is important to note that the service life of electromechanical relays is inversely proportional to the load current and to the number of operations; that is, the greater the number of cycles that an electromechanical relay is actuated and the higher the current through its contacts, the shorter its service life.

This wear mechanism can be particularly significant when the PLS outputs are programmed to operate at relatively high speeds (e.g. > 100 cycles per minute), as these operating conditions can lead to a premature failure of the relay which, ultimately, must be replaced.

To address this problem, ISB recommends the use of optional solid-state relays, which, having no moving parts, provide a longer lifetime and trouble free operation.

However, unlike their electromechanical counterparts, which can be used in a wider range of applications, solid-state relays must be selected according to the specific loading conditions (AC or DC, voltage and current) of each particular application. Please use the information in the table below to select and order optional ISB solid-state relays:

ISB Part number	***Description***
22 0240 00	Solid-state relay, AC output, 1 A @ 250 V AC (black colour)
22 0242 00	Solid-state relay, DC output, 1 A @ 60 V DC (red colour)

Please also note that the load ratings of the solid-state relays is lower than the standard relays provided with the RBPC.

⚠ WARNING: Exceeding the maximum ratings of the solid-state relays may cause permanent damage to the device and may also lead to damage to the internal circuitry of the RBPC

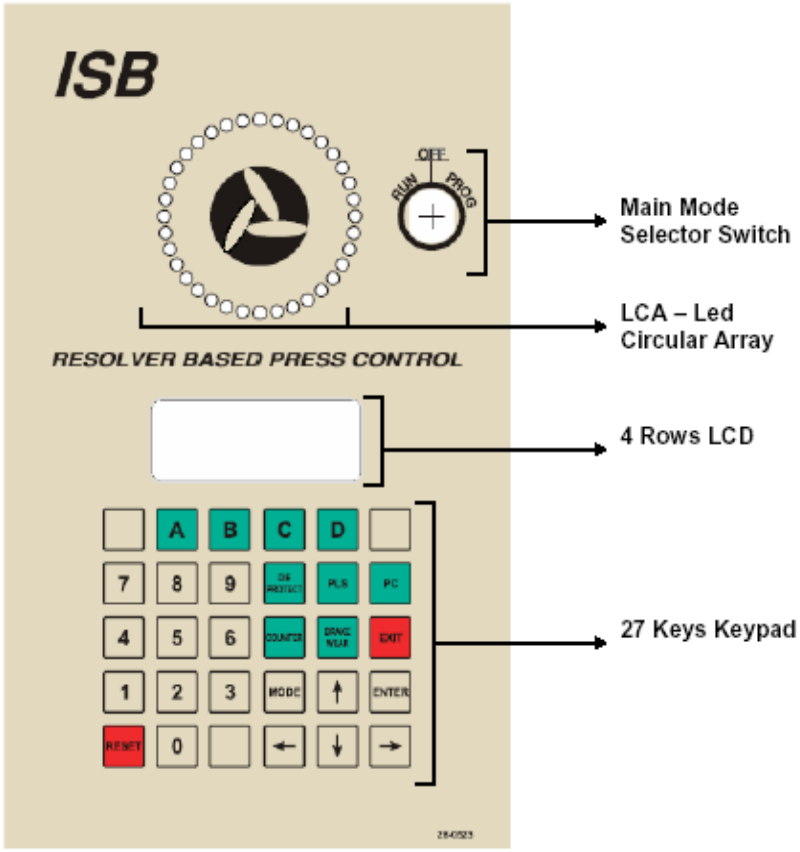
3 System overview

3.1 RBPC at first glance

The RBPC Resolver Based Press Control is a full clutch control with the following features:

- Punch Press and Press Brake control modes.
- Built-in brake monitor that displays stopping time & stopping angle
- Automatically compensates to stop press at top of stroke even with varying press speed or die weight.
- Multi-colour LED circular display array shows press position and displays PLS & Die protection settings.
- Built-in PLS Channels (4), each with 4 dwell settings that are angle on / angle off and include a maximum time setting and speed compensation feature.
- Built-in Die protection channels (4), each with multiple dwell inputs that are universally programmable for function and stop type.
- Additional PLS and die protection channels available using external circuit boards.
- Built-in 300 jobs storage capability. Each job stored will contain press parameters such as operating mode, PLS settings, die protection settings, brake settings, counter info and much more!
- Multi-level password protection; Operator level, set-up level, and supervisor level.
- Numerous built-in counters; total strokes, batch, quality, total faults, running time, etc.
- Fault messages and working conditions recording. Fault codes, hour meters, last stopping times and a variety of other faults are stored internally for troubleshooting, etc.
- Message center with 4-line LCD prompts operator and display user information and settings.
- Durable keypad, 27 keys.
- Standard built-in operating modes; Inch, Single Stroke, Continuous, Auto Single Stroke and Timed inch.
- Standard built-in actuating modes; 2 hand controls (2 sets), electric foot switch (2) Kwik-Trip, PSDI Mode 1, and PSDI Mode 2.
- All modes selectable through keypad.
- All electrical connections made from the back of the panel using plug-in terminal blocks.
- Compact design is easy to install and user friendly.
- Contains many features that are normally found in high-end controllers.

3.2 Front panel



3.2.1 Main mode selector switch

The main selector switch is used to select the RUN/Program and OFF modes of the control. This feature is used for supervisory purposes. The unit can be locked out by putting the key switch in OFF mode and removing the key. The key is also used to lock out programmable features of the unit during operation.

3.2.2 LED circular array (LCA)

This is a circular visual interface to allow the user to know the angular position of the wheel of the machine. It also shows the angles in PLS and DIE protection settings. See the RBPC User's Manual for further details.

3.2.3 LCD display

The Press control screen shows how the machine is operated. It provides the following information to the user:

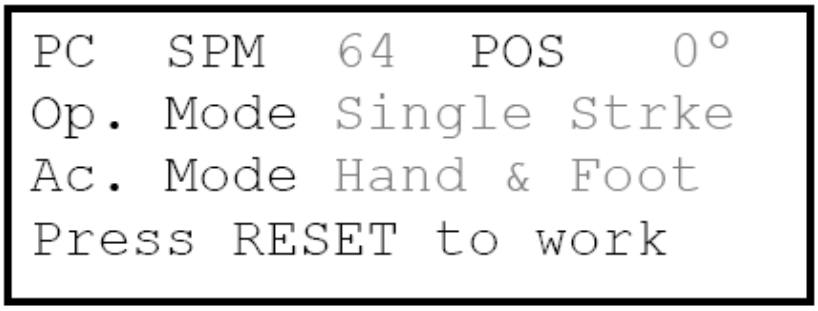
- Current Strokes per minute
- Angular position of the crankshaft
- Current operation mode
- Current Actuating mode

The message line at the bottom of the LCD screen is used for:

- Showing messages when an action is required from the user
- Showing warning and fault messages

The control tells you how to operate and run the machine, also it will tell you exactly what fault has occurred if anything goes wrong with the operation of the press.

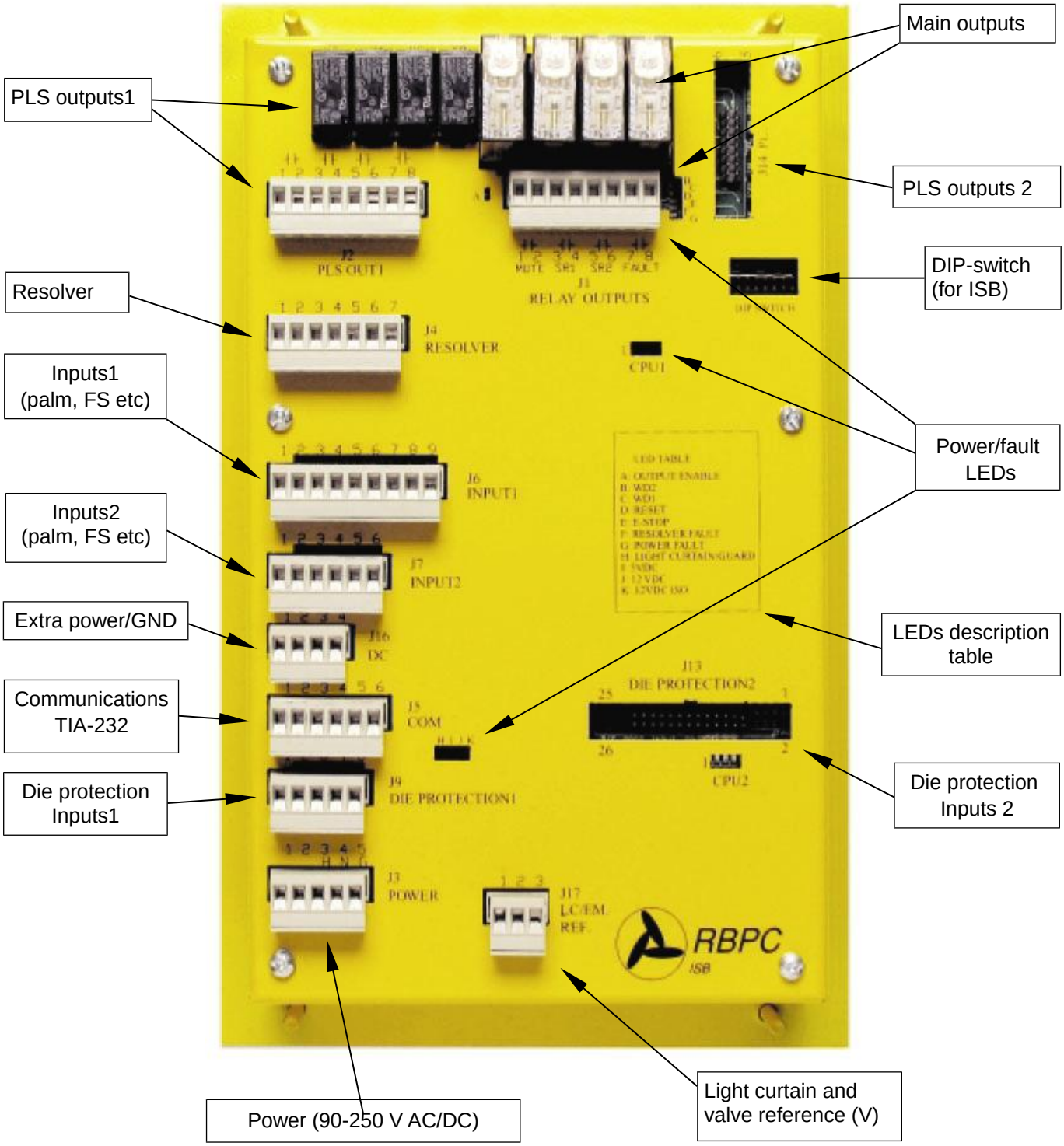
3.2.3.1 Main screen figure



3.2.4 Keypad

The 27-key keypad provides *"hot keys"* for direct and easy access to the desired functions. All jobs and settings are keyed in using this durable keypad.

3.3 Rear panel



The rear panel of the RBPC looks like this. The connector positions might be different depending on the version on the RBPC. All connections are made to the appropriate connector directly to the back of the panel. The Die Protection Inputs2 and the PLS outputs2 require extra hardware to be purchased from ISB.

At the top of the back panel there are eight relays. The first four small relays to the left are the PLS output relays and the four large relays on the right are the output relays for the load.

4 Connection tables

J1: Outputs	
Terminal	*Function*
1	Mute relay (K1, NO)
2	Mute relay (K1, COM)
3	Safety relay 1 (K3, NO)
4	Safety relay 1 (K3, COM)
5	Safety relay 2 (K5, NO)
6	Safety relay 2 (K5, COM)
7	Mute / Fault relay (K7, NO)
8	Mute / Fault relay (K7, COM)

J2: PLS Outputs	
Terminal	*Function*
1	PLS Channel 1 (K2, NO)
2	PLS Channel 1 (K2, COM)
3	PLS Channel 2 (K4, NO)
4	PLS Channel 2 (K4, COM)
5	PLS Channel 3 (K6, NO)
6	PLS Channel 3 (K6, COM)
7	PLS Channel 4 (K8, NO)
8	PLS Channel 4 (K8, COM)

J3: Power / Inputs	
Terminal	*Function*
1	Light curtain monitoring input (H) *
2	E-Stop monitoring input (H) *
3	Power input, Line (hot)
4	Power input, Neutral
5	Protective earth

J17: E-Stop and ligtht curtain monitoring inputs	
Terminal	*Function*
1	Neutral (internally connected to J3-4)
2	E-Stop monitoring input (L) *
3	Light curtain monitoring input (L) *

J4: Resolver	
Terminal	*Function*
1	S4 / A
2	S2 / B
3	S3 / C
4	S1 / D
5	R2 / E
6	R1 / F
7	Shield

Use cable 55 0556 xx (twisted pairs: R1/R2, S1/S3, S2/S4)
To change the resolver ascending count direction, go to the resolver settings in supervisor menu

J6: Sensor inputs	
Terminal	*Function*
1	+12 V (ISO) **
2	Station 1, button 1
3	Station 1, button 2
4	Station 2, button 1
5	Station 2, button 2
6	Foot-switch 1
7	Foot-switch 2
8	Preset
9	Top stop (NC) *

J5: Communication interface	
Terminal	*Function*
1	TIA-232 Transmit data 1 (TX1)
2	TIA-232 Receive data 1 (RX1)
3	Signal ground
4	TIA-232 Transmit data 2 (TX2)
5	TIA-232 Receive data 2 (RX2)
6	No connection

J7: Inputs	
Terminal	*Function*
1	+12 V (ISO) **
2	Kwik-Trip
3	Proximity switch (Resolver check, NC) *
4	Auxiliary Top Stop (NC) *
5	Auxiliary E-Stop (NC) *
6	Reset

J9: Die protection inputs	
Terminal	*Function*
1	0 V (ISO)
2	Die input 1
3	Die input 2
4	Die input 3
5	Die input 4

J16: Isolated power output **	
Terminal	*Function*
1	+12 V (ISO)
2	+12 V (ISO)
3	+12 V (ISO)
4	0 V (ISO

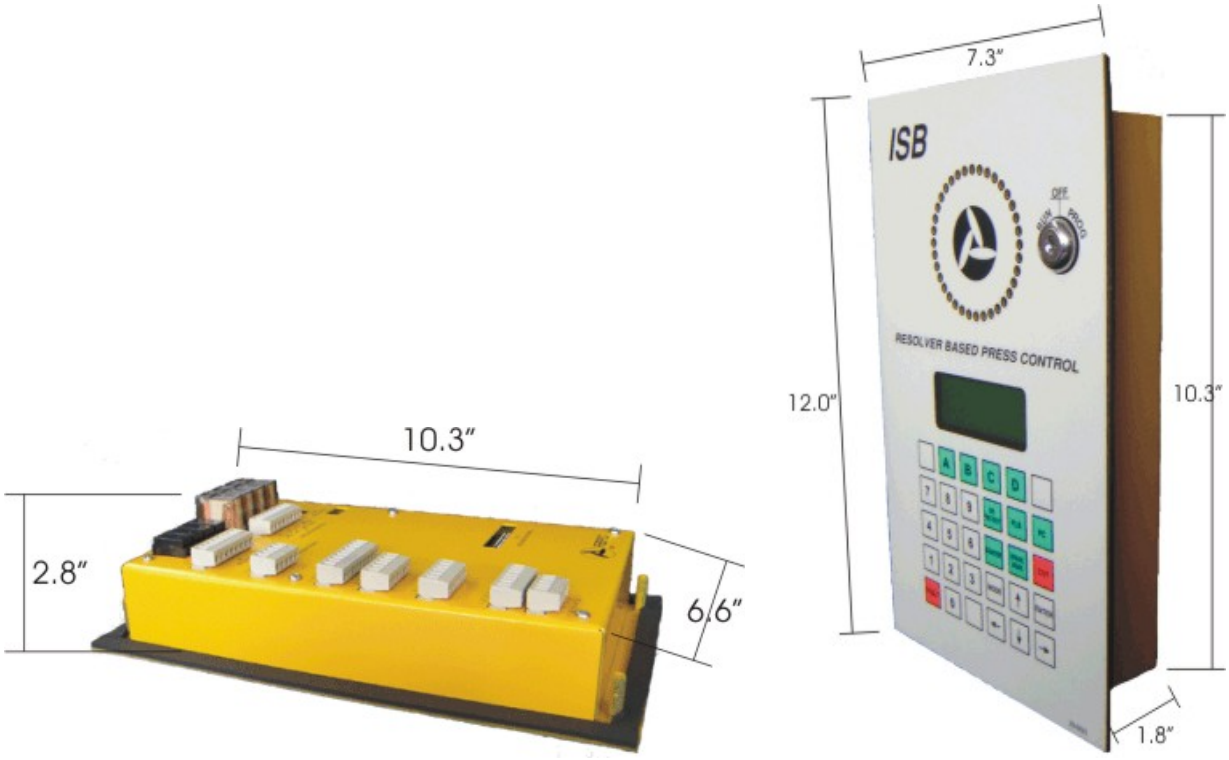
** Total maximum load at +12 V (ISO) < 100 mA

**** These signals must be connected in order to run the press. Refer to the RBPC wiring diagram for further details.***

4.1 Optional connections

J13: Die Protection Inputs 2						***J14: PLS Outputs 2***	
Terminal	*Function*	*Terminal*	*Function*	*Terminal*	*Function*	*Terminal*	*Function*
1	0 V DC ISO	11	DIE11	21	DIE21	1	PLS5
2	0 V DC ISO	12	DIE12	22	DIE22	3	PLS6
3	12 V DC ISO	13	DIE13	23	DIE23	5	PLS7
4	12 V DC ISO	14	DIE14	24	DIE24	7	PLS8
5	DIE5	15	DIE15	25	DIE25	9	PLS9
6	DIE6	16	DIE16	26	DIE26	11	PLS10
7	DIE7	17	DIE17			13	PLS11
8	DIE8	18	DIE18			15	PLS12
9	DIE9	19	DIE19			2, 4, 6, 8	0 V DC ISO
10	DIE10	20	DIE20			10, 12, 14, 16	0 V DC ISO

5 Mechanical dimensions



The RBPC control is designed to fit in a 261.6 mm (10.3”) long and 167.6 mm (6.6”) wide cut out in an existing control box or enclosure.

The outside dimensions are 305 mm (12”) long x 185 mm (7.3”) wide x 46 mm (1.8”) deep.

Leave yourself 75 mm (3”) from the front panel for wiring and space for the safety relays on the back of the control.

6 Part check list

RBPC-SYS1 or RBPC-SYS2:

Item	*Description*	*ISB Part Number*
1	RBPC Control	56 0774 01
2	Resolver mounting bracket	02 0399 00
3	Proximity switch, PNP, M12 with integral cable	18 0223 00
4	Proximity switch mounting bracket	02 0202 11
5	Resolver 3/8” shaft (SYS1) or 3/4”shaft (SYS2)	30 0018 01 or 30 0018 02
6	or 3/4” shaft adapter for 30 0018 01 (SYS2)	02 0889 00
7	Resolver cable, 6.1 m (20 ft)	55 0556 20
8	Strap CAM assembly with lobe	50 0200 00

7 Specifications

Input power	90-250 V DC or AC 50/60 Hz, 48 W max. (internally compensates for fluctuations)
Safety relay output rating	5 A @ 250 V AC, unfused
PLS output relay rating	4 A @ 250 V AC, unfused (standard relays)
	1 A @ 250 V AC, unfused (optional AC solid state relay, P/N 22 0240 00)
	1 A @ 60 V DC, unfused (optional DC solid state relay, P/N 22 0242 00)
Operating ambient temperature	0 °C to 40 °C (32 °F to 104 °F)
Dimensions (H x W x D)	305 mm x 186 mm x 46 mm (12” x 7.3” x 1.8”)

8 Function key

Program Mode (Key-switch in PROG position)	Allows programming of parameters.
OFF Mode (Key-switch in OFF position)	All outputs disabled (de-energized). No programming can occur
RUN Mode (Key-switch in RUN position)	Access to Counters and view Operator settings/ Run the Press

9 Outputs

Mute / Fault Output (Safety relay K7)	Used for connecting across the light curtain contacts for the mute function. Optionally, it can be used to control external devices or an indicator light. This relay can be used in conjunction with the die protection inputs.
Main Output 1 SR1 (Safety relay K3)	Used for connecting to the safety switching device of the machine (e.g. the activation valve of the press).
Main Output 2 SR2 (Safety relay K5)	Used for connecting to the safety switching device of the machine (e.g. the activation valve of the press).
Mute Output (Safety relay K1)	Used for connecting across the light curtain contacts for the mute function.

10 Troubleshooting

The following guidelines will help you to troubleshoot some of the most common fault messages that appear during the initial installation of the RBPC:

10.1 Backwards movement detected

If this fault occurs while doing the initial setup it means that the resolver is not set to turn in the correct direction. Change the direction of the resolver signals in the supervisor menu. This feature can be changed in the *Supervisor Menu → Resolver Settings → Set Work Direction*.

If this fault occurs after the setup and running of the press is complete, it could be cause by a loose gear on the resolver. A temporary fix would be to increase the Backwards detection window. This is done in the *Supervisor Menu → Resolver Settings → Movement Detection*.

Please refer to the *Resolver settings* section of the RBPC User's Manual for further details and step-by-step instructions.

10.2 Resolver check not found

This fault could occur because the resolver offset or zero position is not set correctly. To set the resolver offset go to the *Supervisor menu → Resolver settings → Resolver offset*.

This fault also could be generated because the Proximity switch, which is used for the top dead center check, (resolver check) is not being activated properly. Check the proximity switch and input on J7-3. There are small LED above the inputs used to verify activation of the sensor.

Please refer to the *Resolver settings* section of the RBPC User's Manual for further details and step-by-step instructions.

10.3 Brake time exceeded

This fault is generated because the stopping time of the press exceeds the programmed value in the RBPC. Check the stopping time of the press using the Brake Wear hot key and change the parameters of the brake settings in the supervisor menu to correspond to the viewed value. This can be done through the *Supervisor menu → Braking settings*. View section 14 of the User's Manual on all the details for the brake settings.

Please refer to the *Braking settings* section of the RBPC User's Manual for further details and step-by-step instructions.

If you have any other problems or questions, please call your local ISB representative