

DME Application Note: Typical Cavity Pressure Control Overview:

rev.1.1 11/20/2014 by FWS.

IPC controller: <https://store.dme.net/ipc0102-inject-process-controller>

Bench Test Video: <http://www.youtube.com/embed/FKbnXbkIpT8>



IPC - 01 - 01

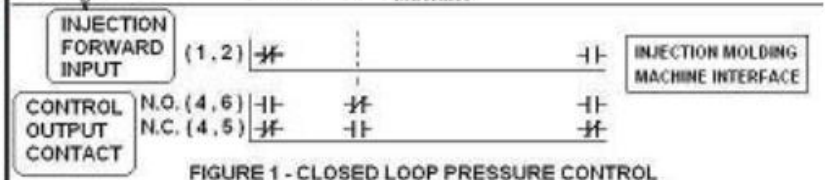
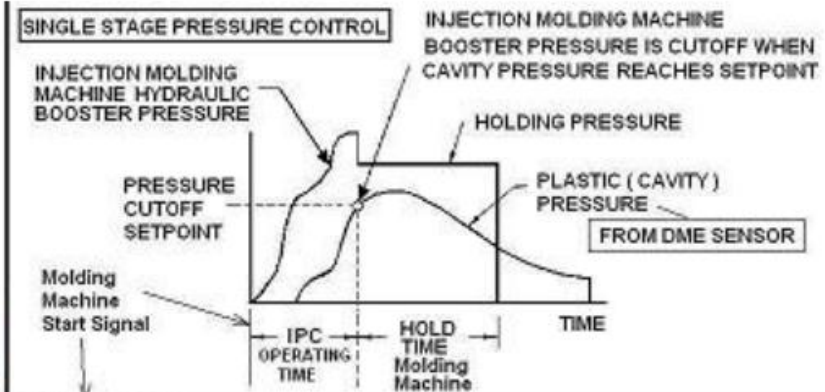


FIGURE 1 - CLOSED LOOP PRESSURE CONTROL

SENSOR RATED LBF RANGE			SWITCH POSITION
2000 Lbf	500 Lbf	125 Lbf	
1/8	1/16	1/32	A
3/16	3/32	3/64	B
1/4	1/8	1/16	C
5/16	5/32	5/64	D
3/8	3/16	3/32	E
1/2	1/4	1/8	F
BS413C	BS412C	BS411C	DME BUTTON SENSOR PRODUCTS
SS406C	SS405C		DME SLIDE SENSOR PRODUCTS

125 LBF RANGE NOT ON IPC0101 BUT CAN BE USED WITH VALUES SHOWN WITH SWITCH POSITION

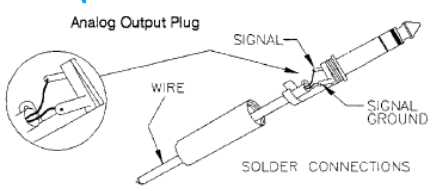
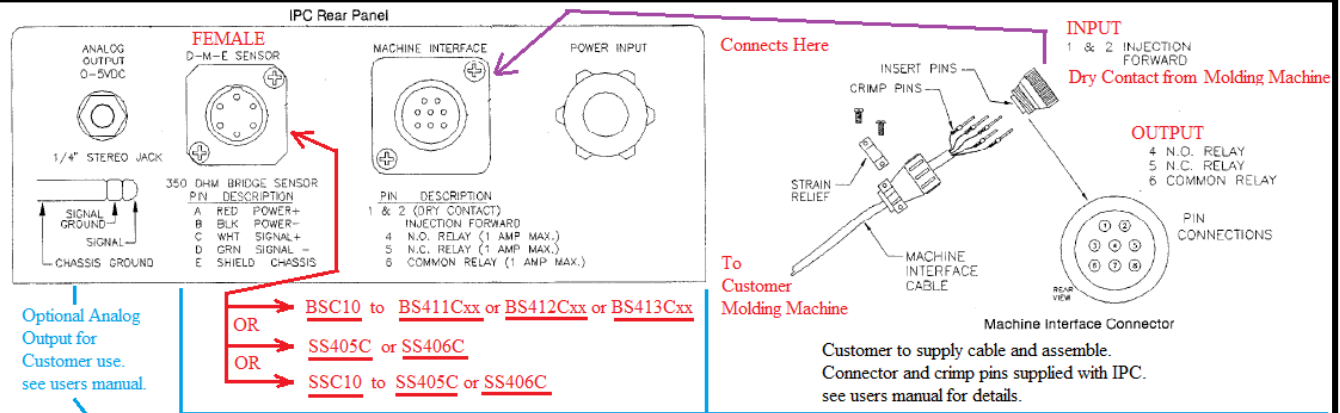
PIN SIZE SELECTOR DIAMETER INCHES

Cavity Pressure Range Chart in PSI

NOTE: IPC only displays 0 to 20,000 PSI (0 to 1999 on 4 digit display which = 19,999 PSI)

IPC SWITCH POSITION	Sensor Loaded 100% Full Scale	Sensor Loaded 15% Full Scale	Sensor Loaded 75% Full Scale
A	162,975 PSI	24,446 PSI	122,231 PSI
B	72,433 PSI	10,865 PSI	54,325 PSI
C	40,744 PSI	6,122 PSI	30,558 PSI
D	26,076 PSI	3,911 PSI	19,557 PSI
E	18,108 PSI	2,716 PSI	13,581 PSI
F	10,186 PSI	1,528 PSI	7,639 PSI

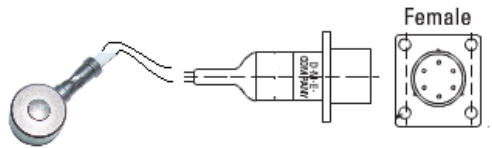
RED values will not display on IPC, they exceeded 20,000 PSI



Customer to Supply Cable and Assembly. Connector supplied with IPC. see users manual for details.

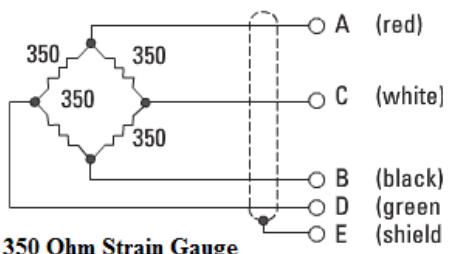
- Provides Amplified Output of Scaled Cavity Pressure Signal when setup correctly with Pin Dia. (0-5Vdc Output = 0 to 20,000 PSI)
- User Selectable Analog Amplified Output: Default 0-5Vdc, user dip switch selectable 0-1Vdc or 0-2Vdc or 0-5Vdc or 0-10Vdc

Button Sensors – Used for Continuous Cavity Pressure Monitoring:



Button Sensor BS411Cxx, BS412Cxx, BS413Cxx
Cxx - see available Cable Length Codes
Cable Cannot be cut due to Sensor Calibration.
BS411 - 125 lbf, BS412 - 500 lbf, BS413 - 2000 lbf
NOTE: MATING CONNECTOR IS AMPHENOL PT06A10-6P(SR).

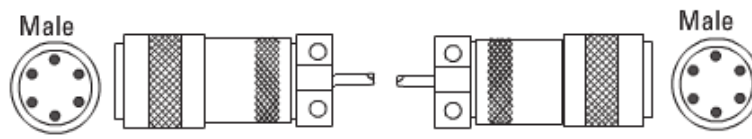
WIRING INFORMATION



350 Ohm Strain Gauge
Calibration Resistors are built into this Assembly, Do Not Alter Cable.

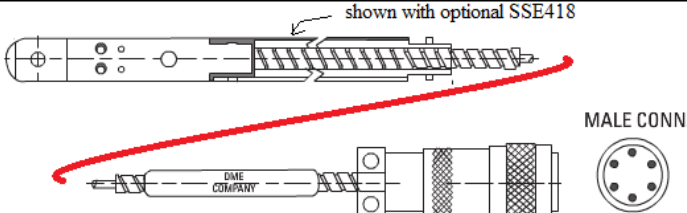
+ POWER	A (red)
- POWER	B (black)
+ SIGNAL	C (white)
- SIGNAL	D (green)
GROUND	E (shield)

WARNING:
DO NOT REMOVE CONNECTOR FROM SENSOR CABLE. CALIBRATION WILL BE ALTERED.



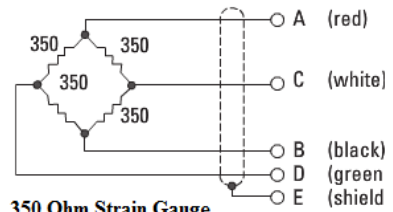
Button Sensor Extension Cable BSC10 10 Ft.
Cable can be cut.

Slide Sensors – Used in Prototype Molds or for temporary monitoring:



Slide Sensor SS405C - 500 lbf, SS406C - 2000 lbf with 10 ft. Cable
Cable Cannot be cut due to Sensor Calibration.
Note: Mating Connector is Amphenol PT01A10-6S(SR)

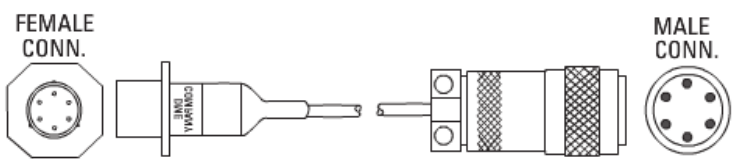
WIRING INFORMATION



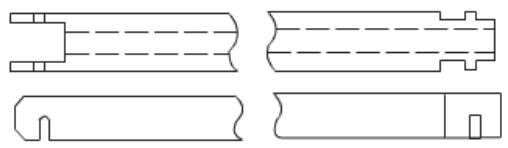
350 Ohm Strain Gauge
Calibration Resistors are built into this Assembly, Do Not Alter Cable.

+ POWER	A (red)
- POWER	B (black)
+ SIGNAL	C (white)
- SIGNAL	D (green)
GROUND	E (shield)


WARNING:
DO NOT REMOVE CONNECTOR FROM SENSOR CABLE. CALIBRATION WILL BE ALTERED.



Slide Sensor Extension Cable SSC10 - 10 Ft.

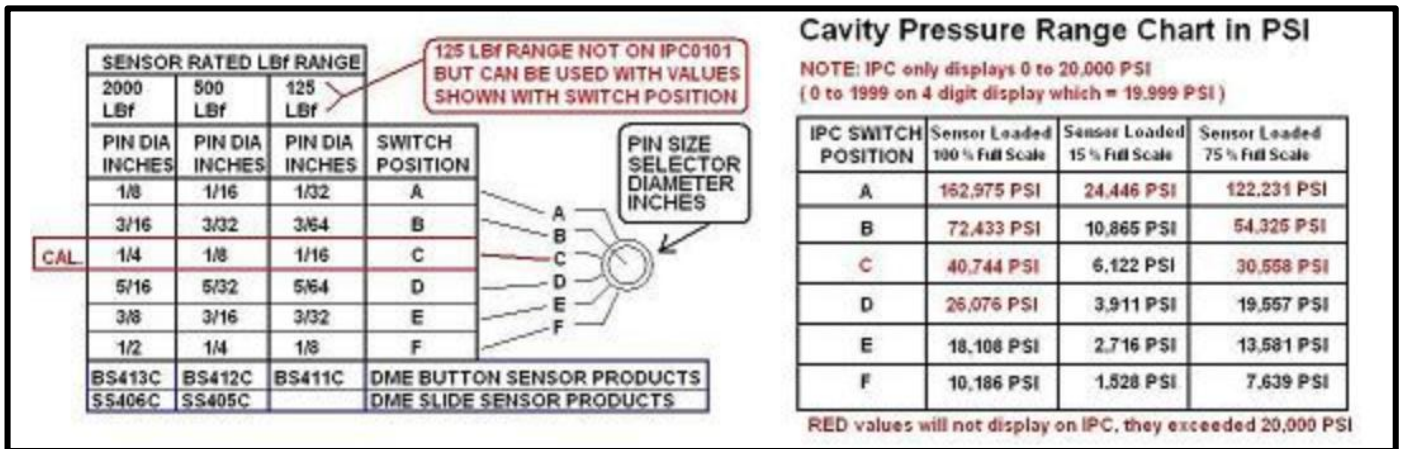


Mechanical Slide Extension SSE418 - helps pull out sensor without pulling on Cable to get sensor out of mold slot.



Sensor Blank SSB419 - when slide sensor not used, this blank replaces it to support the ejector pin.

Typical System Setups Using the DME IPC – Customer MUST decide what THEY need.



Note: the 4 digit IPC meter display range is 0 to 1999, which is 0 PSI to 19,999 PSI, values in RED above exceed this and will not display above 1999 on the IPC. You want your useable Cavity Pressure range to be between the 15% of full scale and the 75% of full scale range for best performance. See above Cavity Pressure Range Chart Above. The 100% full Scale reading above basically means that you are fully loading the sensor used, for example a 500 Lb BS412C sensor at 100% full scale reading will have 500 lbf loaded on the sensor from the cavity pressure transferred over the cross section area of the ejector pin. The sensor can be easily permanently damaged if this range is exceeded.

Most Customers Injection Molding Cavity Pressures are in the 5,000 PSI to 20,000 PSI Cavity Pressure Range. IPC Switch Position " D " works for most applications.

In positions " D ", customer MUST use the following combinations for continuous Cavity Pressure Applications:
NOTE:

- the IPC for this min. reading will only show 391 on display and max. will only show 1955
- remember that the 4 digit IPC meter display range is 0 to 1999, which is 0 PSI to 19,999 PSI.

IPC0101, BSC10, for 5/16" diameter ejector pin use BS413Cxx button sensor
 IPC0101, BSC10, for 5/32" diameter ejector pin use BS412Cxx button sensor
 IPC0101, BSC10, for 5/64" diameter ejector pin use BS411Cxx button sensor

Some customers are trying to retrofit existing injection molds with sensors and may not be able to get a satisfactory setting for the ejector pins that are designed into the current mold. The IPC controller has limited selection capability and may not work at all. Customer can also find other technical notes on line to understand what these limitations are and consult with their process engineers for direction.

TECHNICAL LITERATURE FOR DME PRESSURE TRANSDUCERS - Revision 1.2

(has other ejector pin sizes and pressure charts – many of these ranges are NOT available with the DME IPC0101)

http://www.dme.net/sites/default/files/technical-guides/Pressure_Tutorial_1.pdf

A SHORT TUTORIAL ON CAVITY PRESSURE TRANSDUCER USAGE

http://www.dme.net/sites/default/files/technical-guides/Pressure_Tutorial_2.pdf

Typical Analog Output Signal Examples:

NOTE: It is the customer's responsibility to understand the technical details of the product and their implementations. These notes are provided to help the customer understand some practical examples for consideration.

For bench testing your setup with NO applied Load to the sensor.
DME IPC0101 with 350 Ohm Bridge Strain Gauge DME Button Sensor with 2.0mV/V output sensitivity.



SENSOR RATED LBF RANGE				125 LBF RANGE NOT ON IPC0101 BUT CAN BE USED WITH VALUES SHOWN WITH SWITCH POSITION		Cavity Pressure Range Chart in PSI			
2000 Lbf	500 Lbf	125 Lbf				NOTE: IPC only displays 0 to 20,000 PSI (0 to 1999 on 4 digit display which = 19,999 PSI)			
PIN DIA INCHES	PIN DIA INCHES	PIN DIA INCHES	SWITCH POSITION			IPC SWITCH POSITION	Sensor Loaded 100% Full Scale	Sensor Loaded 15% Full Scale	Sensor Loaded 75% Full Scale
1/8	1/16	1/32	A			A	192,975 PSI	24,466 PSI	122,231 PSI
3/16	3/32	3/64	B			B	72,433 PSI	10,865 PSI	54,325 PSI
1/4	1/8	1/16	C			C	40,744 PSI	6,122 PSI	30,559 PSI
5/16	5/32	5/64	D			D	28,076 PSI	3,911 PSI	19,557 PSI
3/8	3/16	3/32	E			E	18,168 PSI	2,716 PSI	13,581 PSI
1/2	1/4	1/8	F			F	10,186 PSI	1,528 PSI	7,639 PSI

IPC0101 Product page has a video link here: <http://www.youtube.com/embed/FKbnXbkIpT8>

Follow Sensor Calibration Procedure to get 0 and 890 Calibration Points for your 350 Ohm Strain Gauge Bridge Sensor. After Calibration of your sensor, this is a typical result that you should expect.

Note: Accuracy is NOT discussed here, but reading should be within +/-5% of these results.

IPC0101 Controller Front Panel					IPC0101 Controller Recorded Output			Lbf Load Applied on Calibrated and Good Sensor to Produce correlating IPC reading		
	2,000 Lbf BS413C/SS406C	500 Lbf BS412C/SS405C	125 Lbf BS411C	Ejector Pin Size	Holding CAL Button with any DME 350 Ohm Bridge Strain Gauge Sensor			350 Ohm Strain Gauge Sensors Max. Rating		
	Ejector Pin Dia. Inches	Ejector Pin Dia. Inches	Ejector Pin Dia. Inches	Selector Switch Position	IPC Cavity Pressure Readout	Implied Cavity Pressure Readout	Analog Output Volts dc. 0-5Vdc = 0-20,000PSI	2,000 Lbf Full Scale BS413C/SS406C	500 Lbf Full Scale BS412C/SS405C	125 Lbf Full Scale BS411C
	x	1/16	1/32	A	1	over range	5.350 Vdc	440 Lbf	110 Lbf	27.5 Lbf
	3/16	3/32	3/64	B	1585	15,850 PSI	4.140 Vdc	440 Lbf	110 Lbf	27.5 Lbf
CAL.	1/4	1/8	1/16	C	890	8,900 PSI	2.325 Vdc	440 Lbf	110 Lbf	27.5 Lbf
**	5/16	5/32	5/64	D	572	5,720 PSI	1.487 Vdc	440 Lbf	110 Lbf	27.5 Lbf
	3/8	3/16	3/32	E	396	3,960 PSI	1.035 Vdc	440 Lbf	110 Lbf	27.5 Lbf
	1/2	x	1/8	F	223	2,230 PSI	0.583 Vdc	440 Lbf	110 Lbf	27.5 Lbf
			***				*			

Note: Customer must match the actual Ejector Pin Size above with the Strain Gauge Sensor Max. Rating for proper readout.

* - Factory Default 0-5 Vdc Analog Output Range Only shown, customer must correct Analog output for other settings used.

** - Typical operating range for most typical injection molding cavity pressure sensing use. The larger your ejector pin diameter, the more reliable and repeatable your setup will typically run.

Example 1: Position D with one of the following:

Use these settings to measure Cavity Pressure Range 15% full scale 3,911 PSI to 75% full scale 19,557 PSI
Maximum Cavity Pressure

- 5/16" Dia. Ejector Pin with 2,000 Lbf Sensor (BS413C/SS406C) - best
- 5/32" Dia. Ejector Pin with 500 Lbf Sensor (BS412C/SS405C) - better
- 5/64" Dia. Ejector Pin with 125 Lbf Sensor (BS411C) - ok

Example 2: Position E with one of the following:

Use these settings to measure Cavity Pressure Range 15% full scale 2,716 PSI to 75% full scale 13,581 PSI

- 3/8" Dia. Ejector Pin with 2,000 Lbf Sensor (BS413C/SS406C) - best
- 3/26" Dia. Ejector Pin with 500 Lbf Sensor (BS412C/SS405C) - better
- 3/32" Dia. Ejector Pin with 125 Lbf Sensor (BS411C) - ok

*** - Front Panel on the IPC does NOT have this information silkscreened on it, but this is the ejector pin sizes required for 125Lbf Strain Gauge Sensors.

Engineering Changes Made:

rev1.0 Original Application Note Released on 10/15/2014

rev1.1 added section page 4 of 4 on "Typical Analog Output Signal Examples" to rev1.0 on 11/21/2015