MOOG

MRJ04410 Rev. A.

DigiPack Ⅱ

Parison Wall Thickness Controller

J141-214A

INSTALLATION,

MAINTENANCE

AND

USER'S MANUAL

RECORD OF CHANGES

Rev.	Page	Description	Prepared	Checked	Approved
Orig.		New Model Release	T. Kouda 13, Jan' 12	R.Nagasaki 18, Jan' 12	M. Shiga 18, Jan' 12
A	71-75	RS422 Communications protocol correction ・ When write the profile system communication command (PX), automatically write to a flash. (Delete PF Command) ・ When BCC of a communication command is "**", a check is skipped and it answers as normal.(Change of explanation of the BCC command)	T. Kouda (2, Mar' 12)	R. Nagasaki (3, Mar' 12)	M. Shiga (3, Mar' 12)

NOTES TO USERS

(1) Description in this manual is subject to change without any obligation on the part of the Manufacturer.
(2) Notice would be appreciated if you find any question, omission or error in this manual.
(3) Disassembly, maintenance or repair, other than in accordance with the instruction herein or other specific written instruction from MOOG will invalidate MOOG's obligations under its warranty. Refer to MOOG warranty for complete previsions thereof.

SAFETY INSTRUCTION

Description in this manual is essential to the safety of life and property, therefore, before operating this equipment, you should first thoroughly read this manual, and this manual should be kept in accessible for when you have any questions.

WARNING

This symbol with the word "WARNING" is used to call attention to safety instructions concerning a potential hazard to people. Failure to comply with these safety instructions can result in serious damage to health and can even prove fatal in extreme cases.

CAUTION

This symbol with the word "CAUTION" is used to call attention to instructions concerning potential damage to the equipment or to the system as a whole.

NOTE

Notes contain useful information to the operator when starting up and operating the equipment or system.

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CB36481 ---------- Customer Wiring

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1. DigiPack Ⅱ Manual, Installation and Maintenance

1-1. Change from J141-214

The basic specification of DigiPack Ⅱ (J141-214A) is equivalent to conventional J141-214.

Refer to the following table for a changed part.

	Modify Items	J141-214	J141-214A	Comment
1	Timer Backup	Button cell. Retention time is about five years and needs to be ex-changed.	Ultra capacitor Exchange is unneces-sary although retention time is about three weeks. Charge to a capacitor is performed by carrying out a turning on elec-tricity start.	When time is not correct by no turning on electricity for a long period of time, the right time is set up on F2 screen. Due to battery exchange was not needs, the necessity for maintenances other than failure is not need.
2	Production quantity man-agement	with functional	Function deleted.	A time setup was added to the portion which the screen (F2) of production control deleted.
3	DCDT Power	±15V	±10Vref The power supply for DCDT was changed into the stabilized power supply of ±10V.	It changed for stabilization of the power supply for sensors of a core position. Moreover, it was referred to as ±10V so that it might be united with an input range. The method of wiring changes. Please refer to *Figure 1-19 TB-1 Con-nections* in Page 21.

1-2. INTRODUCTION

1-2-1. GENERAL DESCRIPTION

The J141-214A **DigiPack Ⅱ** is a user friendly, high performance 100 Point Digital Blow Molding Parison Wall Thickness controller producing lighter, stronger containers at increased production rates.

A properly installed and intelligently used system will deliver higher operating efficiency from your blow molding machine as a result of faster molding cycles, shorter change over times and reduced scrap.

The **DigiPack Ⅱ** system consists of three main components, the **DigiPack Ⅱ** control panel, a die gap tooling actuator, feedback transducers to measure tooling die gap opening and in the case of accumulator based blow molding machines, accumulator position. Together, they operate as follows:

The **DigiPack Ⅱ** control panel is used by the operator to control the tooling die gap opening required to obtain a container with the desired, normally constant, wall thickness required.

The die gap tooling actuator controls the thickness of the parison at the tooling die gap in response to the **DigiPack Ⅱ** control panel signals.

The **DigiPack Ⅱ** control panel provides an digital interface with the blow molding machine's PLC controller, providing information such as program end, sequential program points status etc.

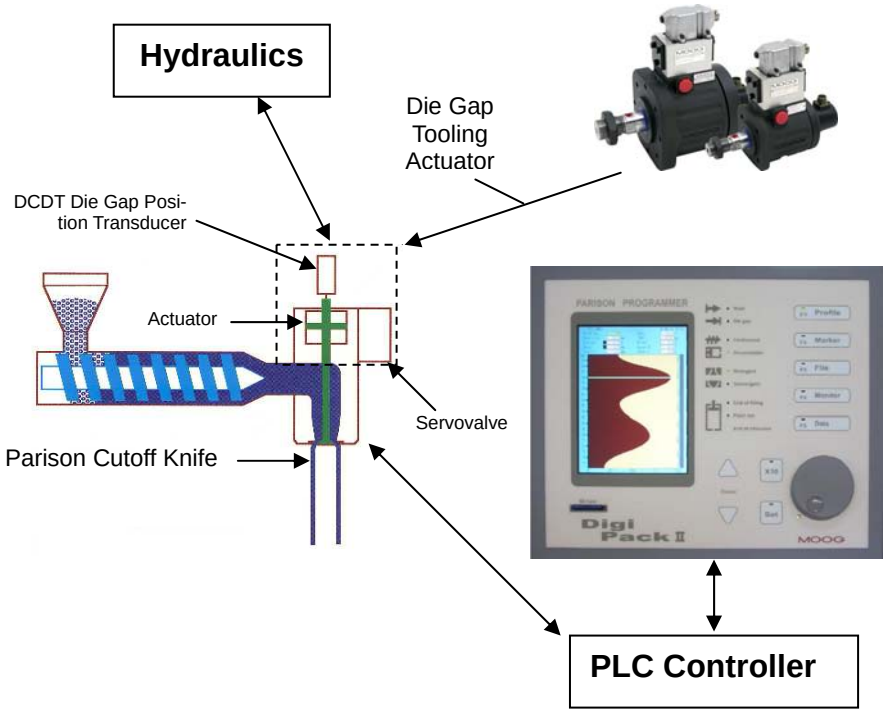


Figure 1-1 Basic Continuous Blow Molding Machine Control Diagram

When used with continuous blow molding machines, the **DigiPack Ⅱ** controls the parison wall thickness relative to the machine cycle time. The machine cycle starts when the parison cutoff knife cuts the parison off. Cycle time may be determined by:

a) a fixed, operator set cycle time or,

b) an automatic cycle time, set by repeated measurement of the time between parison knife cuts or

c) using a fixed DigiPack Ⅱ time cycle and having the DigiPack Ⅱ initiate a machine function such as closing or moving the mold.

The shape of the parison wall profile is set digitally by the operator. The size of the die gap, measured by a die gap position transducer, is compared with the operators commanded position as set on the **DigiPack Ⅱ** display.

The error between the operators set position and the actual position causes the servovalve to flow oil to the actuator to reduce the position error to a very small value. This feedback process ensures that the actual die gap follows the commanded die gap very accurately.

When used with accumulator machines, the **DigiPack Ⅱ** controls the parison wall thickness relative to the accumulator position as the plastic is being extruded.

As the total quantity or volume of plastic extruded is proportional to the accumulator position, then it follows that the resulting parison wall thickness at any given point on the length of the container must be related to the accumulator position. Given that the physical properties of the plastic and its temperature are constant from container to container, then each container's weight and strength will be consistent.

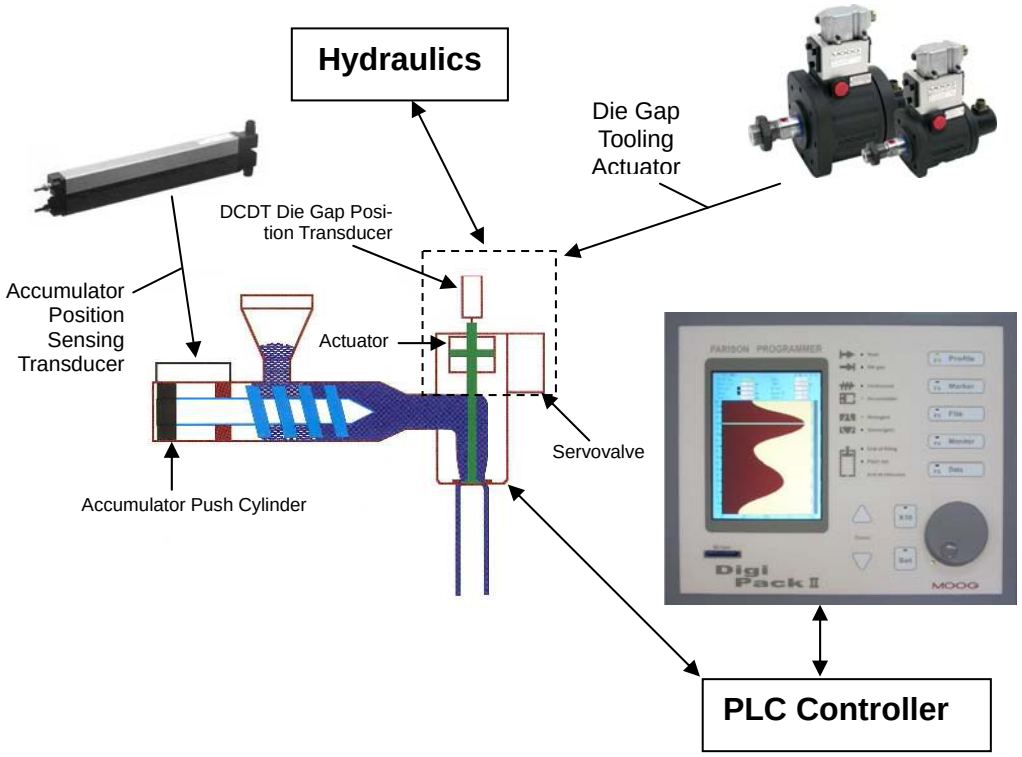


Figure 1-2 Basic Accumulator Machine Control Diagram

A potentiometer measures the accumulator position and controls the vertical axis of the program display.

The operator can also set the accumulator working stroke, Shot Size, and the desired position at the end of the accumulator push out, Cushion the **DigiPack Ⅱ** also provides interfacing signals for these functions with the machines PLC, which then controls motion of the accumulator.

Set up of the die gap tooling and tooling die gap actuator has been easier with simplified detection of mandrel die zero.

Successful performance of the **DigiPack Ⅱ** depends a great deal upon how well it is installed on the machine. By following the instructions contained in this manual it will be possible to easily install this system and obtain many years of trouble free operation.

1-2-2. WHO CAN INSTALL THE DigiPack Ⅱ

The installation of the **DigiPack Ⅱ** control system requires the installer to be familiar with electrical wiring, hydraulic plumbing and basic metal working. The calibration and start up of the finished system requires some understanding of the blow molding process and use of test instruments such as a digital voltmeter. The plumbing, wiring and bracketry should not be difficult. Most molding shop maintenance men who are familiar with blow molding machines will have little difficulty with the help of this manual.

The system can be satisfactorily calibrated to the machine and started up without assistance or special equipment by following the instructions in this manual.

1-2-3. INSTALLATION TIME

The time to install a **DigiPack Ⅱ** varies with the type and size of machine, mechanical constraints such as the location of water lines and auxiliary equipment and the ability of the mechanic doing the installation.

Our experience has shown that typical maintenance men will require about 20 to 30 man hours. Smaller machines will require less time.
Of this time, the actual machine shut down time can be held to 6 hours or less.

1-2-4. SOFTWARE UPDATE

When the Software version is upgraded, we will release new software as "DIGIPK2.FWM". This is very easy to upgraded, see following description.

Update Process

1. Power OFF DigiPack Ⅱ and take out SD card from slot.
2. Save "DIGIPK2.FWM" file in to SD card with using your PC. (*Figure 1-3*)
3. Put SD card in to DigiPack Ⅱ again. And Power ON DigiPack Ⅱ.
4. While Power up process (before showing start up display, see *Figure 1-4*), Press two keys **"X10" and "Cursor Down ▽ "** same time. The key location, please refer to *Figure 1-33*.
5. If display indicate "Updating firmware……", update process running.
6. Then showing startup display now, please check software version.(*Figure 1-4*)

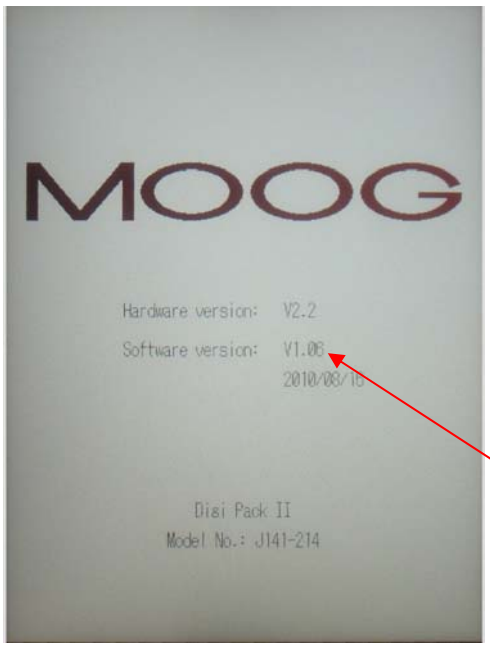


Figure 1-4 Start up Display

Figure 1-3 SD card

The SD card is enclosed with DigiPack Ⅱ. And "DIGIPK2.FWM" is already saved in SD card, if released new file of "DIGIPK2.FWM", pleas overwriting new file.
SD card (2GByte) Parts No.; CA95932-001

1-2-5. BACKUP BATTERY

Since backup of an internal clock is using the ultra capacitor, there is no necessity for exchange.
Backup time is about three weeks.
A time display may be [----.--.-- --:--] when not turning on electricity the time of the power activation after purchase, and for a long period of time.
In such a case, please set up the right time on F2 screen. (Reference 2-4-3.)

1-2-6. DISPLAY LIMITED INDICATION PROTECTION

DigiPack Ⅱ has two different level of setup display. These two different displays are divided to operation level (F1 to F5) and setting level (F1+Set to F5+Set). And can be distinguish which level display showing now from background color. Operation level indicate background color as Cyan" " and setup displays are indicated as Yellow " ".
If set to level "low", operate can be call display only operation level display. And if set to high level, can be call all display both operation and setup display.

Change Level
At any display press "F5" and "Set" key then hold 5 sec. (to see the "*Figure 1-5*" for location of switch) The level alternately changes "Operation" ⇔ "Setup". If you want change back to old level, do again press "F5" and "Set" key and hold 5 sec.

This level change **does not indicate any notice** on display. Please check the level was correctly changes or not by press F1+Set, if the level "Low" should not goes to setup display

Figure 1-5 Limit level set.

DigiPack Ⅱ Manual, Installation and Maintenance

1-3. DigiPack Ⅱ SPECIFICATION

Model Number:	J141-214A **DigiPack Ⅱ.**
Function:	100 Point Single Head Blow Molding Parison Programmer.
Application:	Accumulator Based or Continuous Extrusion Blow Molding Machines may be selected.
Profile Points:	100 points. And Straight or Spline interpolation can be selected.
Tooling Type:	Divergent or convergent die gap tooling types can be selected.
Tooling Position Control:	Digital closed loop servo system with a 0.5m sec update time.
Tooling Position Monitor:	From Tooling Position Actuator's DCDT ± 10 VDC. From Accumulator Potentiometer 0 to 10 VDC FS.
Programming Inputs:	By entry knob and front panel switches.
Display:	Color Display (LCD). 480(W) x 640 (H) pixels. English/Japanese/Chinese language selected by Parameter at Setup screen.
Memory:	100 program profile patterns can be stored in a Flash RAM. And able to saved in to SD card. *SD card supported standard type and up to 32GByte (SDHC) data size available.
Marker:	A marker output signal can be set maximum 10 program point.
Other Functions:	Shot Size, Delay, Cushion (for accumulator machines only), die gap, data saving, profile curve adjustment (Weight and Range H/L), adjustment of the tooling actuator stroke and the accumulator position transducer, battery backup for the system timer.
Output to Servovalve:	MFB type: ± 10, 20, 50, 100 mA or EFB type: ± 10 VDC
Servovalve Monitor:	± 100% Spool Stroke equals 4-20mA
I/O for Accumulator:	0 to 10 VDC transducer output and 10 V DC transducer excitation.
I/O for Tooling Position:	± 10 VDC DCDT output and ± 10 V DC DCDT excitation.
Common External Input:	Photo Coupler Isolated Customer Supplied 15 to 24 Vdc @ 10 mA /Channel
24 VDC External Outputs:	Photo MOS Relay Customer Supplied 15 to 24 Vdc @ 100mA /Channel Max. End of Extrusion/Filling Relay Contacts: 250Vac @ 1 A/channel MAX.
Communication:	Data transfer with host computer by RS422 and Ethernet
Power Requirements:	24 VDC 0.5A min (MAX 3.0A depend on Servovalve Power required) No ripple requirement : Max +-10 %
Temperature/Humidity:	0 to 45°C within 95% relative humidity
IP rating	Front side = IP20, Rear side = IP30
Dimensions:	288 (W) x 240 (H) x 80 (D) mm
Weight:	3.2 kg

DigiPack Ⅱ Manual, Installation and Maintenance

1-4. CHECK LIST

1-4-1. INSTALLATION CHECK LIST

Order parts for installation

Identify component mounting locations and procure the necessary mounting brackets

Install the DigiPack Ⅱ unit in the blow molding machine or optional enclosure

Mount tooling servoactuator to machine

or Mount servovalve manifold and

or Mount DCDT to tooling actuator

Mount servo actuator pressure filter

Install hydraulic power supply

Install main system filter

Make hydraulic pressure and return connections and flush the hydraulic system,

Mount accumulator position transducer, if required

Install conduit and pull cables for the tooling servoactuator, transducers, filter differential pressure switch and interface between the DigiPack Ⅱ control panel and the machine PLC

Check the wiring

Calibrate transducers

Set up the control loop

Connect the actuator to the die gap tooling and adjust the die gap end points.

DigiPack Ⅱ Manual, Installation and Maintenance

1-5. MECHANICAL INSTALLATION

1-5-1. GENERAL

Mounting provisions for the tooling servoactuator should include a stable mounting platform for the tooling actuator, a filter location which allows the filter element to be readily replaced and mechanical provisions allowing simple adjustment of the mechanical relationship between the actuator and the die gap. "*Figure 1-6*" shows such as a well planned installation.

A tooling servoactuator provides a long lived solution to the problems caused by high temperatures and force levels. Low friction seals and strong bearings insure long term and good tooling die gap positioning performance. A built in position transducer provides mechanical isolation from shocks and climbing feet. A directly manifold servovalve is tightly coupled to the actuator. "*Figure 1-7*" illustrates a packaged tooling actuator with provisions for pre-blow air.

"*Figure 1-6*" shows a typical tooling actuator installation. A servovalve (upper right) is directly mounted on a manifold, which in turn is attached to a tooling actuator. Directly below is a DCDT position transducer measuring the actuator rod and die gap tooling motion. In addition, a high pressure filter mounted directly on the manifold provides clean oil to the servovalve. Tooling adjustment provisions are also shown.

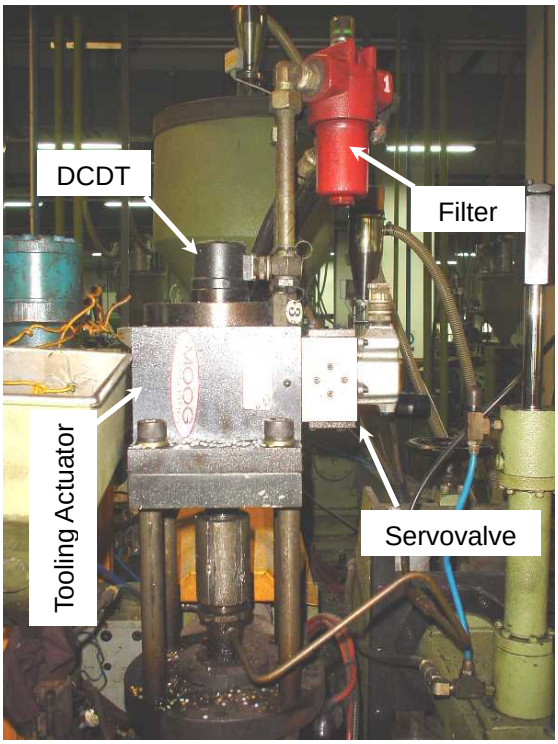


Figure 1-6 Die Gap Tooling Actuator Installation

Figure 1-7 Die Gap Tooling Actuator

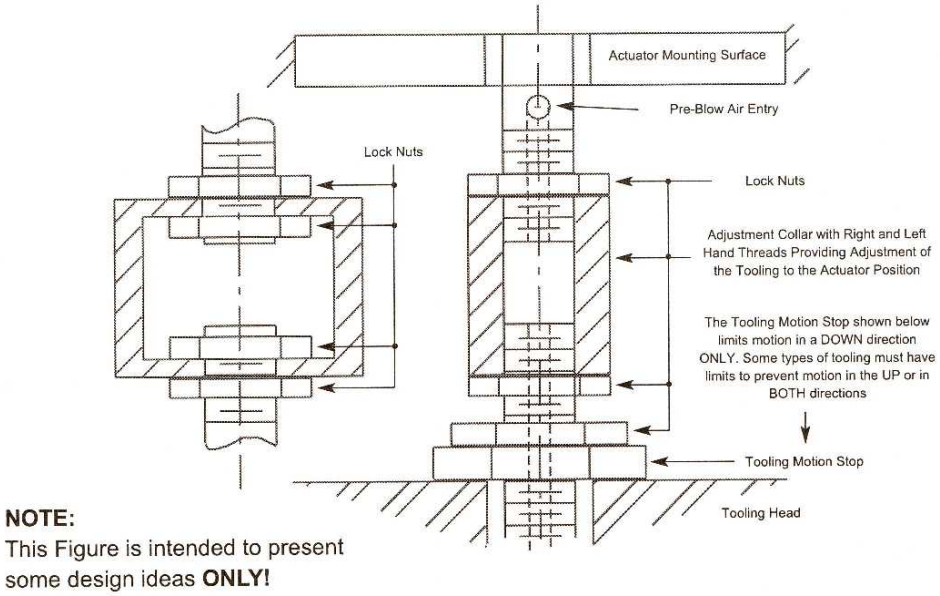


Figure 1-8 Actuator – Die Gap Tooling Mechanical Adjustment

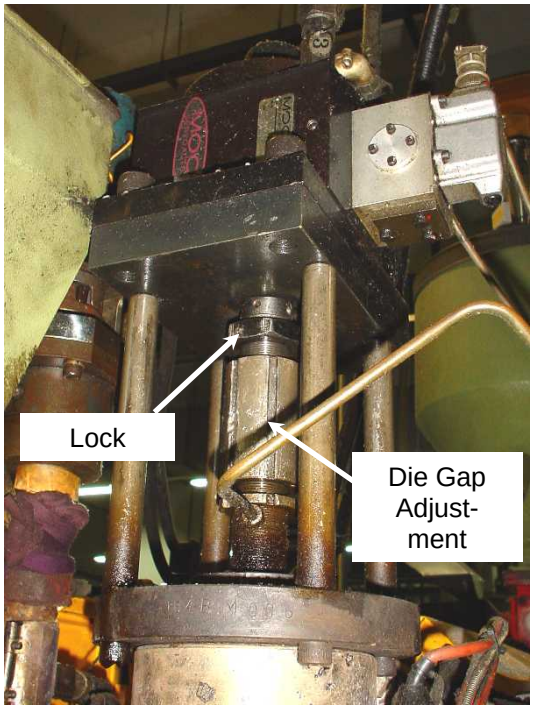


Figure 1-9 Tooling Adjustment Mechanism

1-5-2. TOOLING ADJUSTMENT

When a mold change is made, it is often necessary to change the die gap tooling assembly. Therefore the actuator installation must provide for simple adjustment of the die gap tooling position relative to the actuator position. "*Figure 1-8*" shows two possible methods of adjusting the positional relationship between the tooling actuator and the die gap tooling's closed position. Tooling motion stops may be required to limit the forces on the die gap tooling when the die and mandrel touch. "*Figure 1-9*" is a typical installation.

Some actuators with an anti-rotation feature require the nut torque loads on the anti-rotation device to be limited by absorbing the tightening torque with a wrench on the actuator rod flats

Tooling stops are required to insure a die gap that cannot close on a continuous molding machine. An inadvertent closure of the die gap could cause very high pressures in the extruder barrel and extrusion head and result in their damage and/or failure.

The above comments must be considered for the proper installation of either a Moog supplied die gap tooling actuator or a customer supplied actuator.

The extruder barrel and/or screw can be severely damaged if the die gap closes when the extruder is running. A mechanical motion stop must be installed which will not allow the die gap to close.

1-5-3. MOOG DIE GAP TOOLING ACTUATORS

The Die Gap Tooling Actuator is designed specifically to control the die gap motion in blow molding extrusion heads. Their design specification includes: Low friction, Long life piston and rod seals. Graphite flake cast iron rod bearings to absorb potential side loads and high temperatures. Provision for blow air through the piston rod, and pre adjusted position feedback transducer.

The mounting provisions for a die gap tooling actuator must include: a strong mounting structure, provisions for axial and parallel alignment of the tooling actuation rod (mandrel) with the die gap actuators rod, provisions to allow the actuator stroke center and the tooling's effective stroke center to coincide, tooling motion stops to protect the tooling and/or extruder. "*Figure 1-7*" illustrates a packaged tooling actuator.

Actuator Phasing	Actuator Position Connections	Transducer	
The actuator rod extends when valve G631-XXX Pins A, C are positive with respect to Pins B, D.	Pin A	+DC input	Actuator Position Transducer Phasing
	Pin B	GND	Pin C is positive with respect to Pin D
	Pin C	Output	when the actuator is retracted.
	Pin D	Output	Connector mates with MS3106-14S-5S
	Pin E	Not used	

1-5-4. CYLINDER INSTALLATION

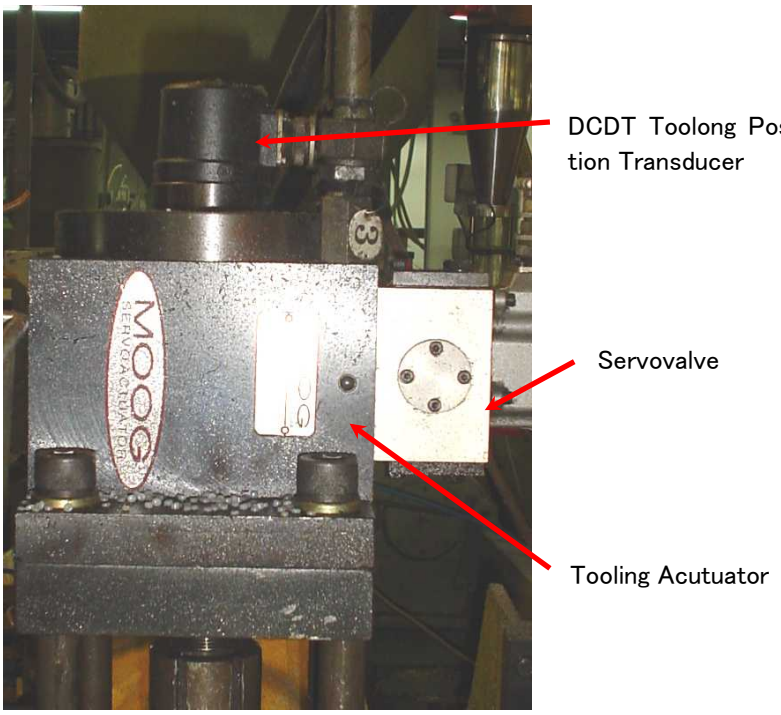


Figure 1-10 Typical Cylinder Installation

1-5-5. CUSTOMER SUPPLIED CYLINDER REQUIREMENTS

The customer supplied cylinder is required to control the die gap motion in blow molding extrusion heads. As such their purchase specification must include: Low friction, long life piston and rod seals; Robust rod bearings capable of absorbing large potential side loads and high temperatures. A quality cylinder must be purchased to meet these requirements.

The mounting provisions for the tooling actuator shall include: a strong mounting structure, provisions for axial and parallel alignment of the tooling actuation rod (mandrel) with the die gap actuators rod, provisions to allow the actuator stroke center and the tooling's effective stroke center to coincide, tooling motion stops to protect the tooling and/or extruder.

Some actuators with an anti-rotation feature require the nut torque loads on the anti-rotation device to be limited by absorbing the tightening torque with a wrench on the actuator rod flats.

1-5-6. MANIFOLD

The manifold must be mounted using as close as possible to the cylinder. Ideal methods are to mount the manifold directly on the cylinder, sealing the ports with "O" rings or to use tubing between the cylinder and manifold.
The pressure and return connections should be straight thread fittings using an "O" ring as a seal. Tapered thread fittings are not encouraged as they tend to leak and when they are torqued up to stop the leak, the servovalve mounting surface is distorted, causing leakage at the servovalve–manifold seal. Straight thread fittings using "O" rings do not leak or cause mounting surface distortion.

Should tapered thread fittings be used, ONLY Teflon tape can be used on the tapered threads as a sealant. The Teflon tape must not cover the last two threads at the smaller diameter portion of the thread. Any other material will cause eventual contamination problems.
"*Figure 1–9*" shows two possible methods of adjusting the positional relationship between the tooling actuator and the tooling die gap closed position. Tooling motion stops may be required to limit the forces on the die gap tooling when the die and mandrel touch. "*Figure 1–10*" is a typical installation.
Tooling motion stops may also be required to insure a die gap opening on a continuous molding machine. An inadvertent closure of the die gap could cause very high pressures in the extruder barrel and extrusion head and result in their damage and/or failure. The above comments must be considered for the proper installation of either a Moog supplied die gap tooling actuator or a customer supplied actuator.

1-5-7. SERVOVALE MOUNTING

The servovalve is mounted to a manifold with four mounting screws and using four "O" rings to seal the Pressure, Return (Tank), and the two Cylinder hydraulic connections.
The "O" ring seal between the servovalve and manifold depends upon the servovalve mounting manifold surface flatness to insure that there are no oil leaks. This surface must be flat within 0.025mm and have a $\sqrt{}$32 RMS finish.
Two servovalves mounting patterns are available: a Cetop 5, NG 10 or a Ø22,2mm, Moog 76 port circle.

Figure 1–11 G631–XXX Servovalve

1-5-8. TOOLING ADJUSTMENT

When a mold change is made, it is often necessary to change the die gap tooling assembly. Therefore the actuator installation must provide for simple adjustment of the die gap tooling position relative to the actuator position.

The extruder barrel and/or screw can be severely damaged if the tooling die gap closes when the extruder is running. A mechanical motion stop must be installed which will not allow the die gap to close.

1-5-9. ACCUMULATOR POSITION MEASUREMENT

Accumulator type blow molding machines require a position transducer to indicate the accumulator position. The parison wall thickness pattern can then be programmed with direct reference to the accumulator stroke of Shot Size.

If the DigiPack Ⅱ is being installed on a continuous extrusion machine please go to the next section.

1-5-10. INSTALLATION REQUIREMENTS

The position transducer is required to operate in a high temperature and vibration environment. In addition the transducer must accommodate some mechanical miss-alignment without reduction of life and linearity.

Transducer installation designed to control and adjustment the alignment between the potentiometer and the accumulator motions. The features are as follows:

1) An accumulator driven bearing guided structure for the potentiometer drive arm
2) Mounting provisions for the potentiometer on the same bearing guided structure, provisions for adjustment to insure parallel motion of the potentiometer guide arm and potentiometer drive rod
3) And a rod end bearing between the potentiometer drive rod and the potentiometer guide arm

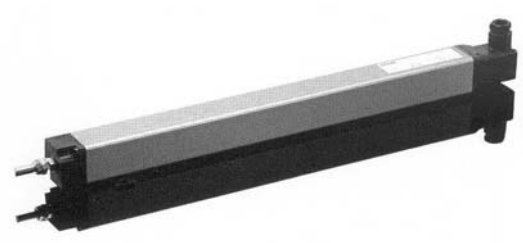


Figure 1-12 Typical Linear Potentiometer

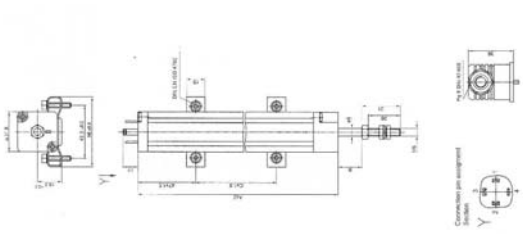


Figure 1-13 B82000 Potentiometer Installation

Installation Information

P/N B82000 –		**300**	**500**	**750**	**900**
Electrical Data					
Rated Stroke	mm	300	500	750	900
Nominal Resistance	Kohm	5	5	10	10
Independent Linearity	%	0.07	0.05	0.05	0.05
Mechanical Data	mm				
Mechanical Stroke	**B**	312	515	769	922
Body Length	**A**	375	579	833	985
Mounting Feet Spacing	**X**	280.5	484.5	738.5	890.5

1-5-11. THE IMPORTANCE OF FILTRATION

Figure 1-14 High Pressure Filter

Adequate contamination control in any hydraulic system is the key to a highly reliable system. Proper filter placement and selection insures long term trouble free operation of every hydraulic system component. There are three essentials:

1) a high pressure filter mounted directly at the tooling actuator
2) a re-circulating circuit providing continuous filtration and heat removal
3) proper control of the tank breathing and filling operations to prevent the ingression of contaminant

High pressure filter ($\beta_{15} \gg 75$, 15μ absolute) mounted directly with tubing at the tooling actuator provides protection against particles created by component failures.

The main contamination protection is provided by oil taken from one corner of the tank, flowing through the low pressure re-circulating filter back to the opposite corner of the tank. The re-circulation filter is a low pressure filter ($\beta_3 \gg 75$, 3μ absolute) with an inexpensive replacement filter element. The re-circulation also incorporates a heat exchanger to maintain low oil temperature and insure adequate oil life.

Protection against ingression of contaminant during oil make up and normal breathing is provided with breather rated at 10μ.

1-5-12. FILTER INSTALLATION

High pressure filter or equivalent, $\beta_{15} > 75$ rated, high pressure filter must be mounted as close as possible (50mm to 300mm) to the actuator or servovalve manifold. The location of the filter must allow an easy access to make a replacement of filter element easy and safety.

Filter Installation Information

The hydraulic connection between the filter and actuator must be tubing. Under no circumstances can hydraulic hose be used as the hose is a contaminant generator and this contaminant will go directly into the servovalve, eventually causing contamination problems.

The hydraulic connections used will be a straight thread "O" ring sealed boss into the servoactuator and high pressure filter with either flared or compression fittings used to connect the tubing to the straight thread fittings.

The use of tapered thread fittings with pipe dope will cause both contamination and leakage problems. Teflon tape may be used, but only if applied in such a manner as to keep the edge of the Teflon tape at least two threads away from the end of the fitting.

1-5-13. HYDRAULIC POWER SUPPLY

The Hydraulic Power Supply provides clean oil to the die gap tooling actuator at a constant supply pressure. An accumulator provides the peak flows that may be required. A water heat exchanger ensures reasonable oil temperatures.

The Hydraulic Power Supply is normally used on first installations when the cleanliness condition of the blow molding machine's hydraulic power supply is unknown or suspect.

A separate hydraulic power supply provides a reliable source of clean oil for trouble free long term operation. A bypass filter allows the oil to be continually cleaned and cooled.

The hydraulic power supply pressure output should be connected directly to the input port of the high pressure filter at the die gap tooling actuator or the servovalve manifold. The actuator or manifold return line goes to the hydraulic power supply return port.

Figure 1-15 Hydraulic Power Supply

1-5-14. HYDRAULIC POWER SUPPLY START UP INSTRUCTIONS

1) Check for any damage to the hydraulic power supply and its parts.
2) Fill the tank through the breather filter with Shell/Tellus 68 or equivalent fluid.
3) Check the nitrogen gas pressure in the accumulator bladder. The pressure should be 35 bar or 66% of the maximum system pressure, whichever is higher. Add nitrogen, if necessary.
4) Replace the filter elements with flushing elements. Store the original filter elements in a clean, very clean plastic bag.
5) Connect the pressure and return lines to and from the tooling actuator assembly
6) Check the motor name plate for the correct line voltages and connect the motor to power. Start the motor and check that it rotates in the proper direction.
7) Connect cooling water to the heat exchanger. The required water flow rate is 30 1/min at 2-3 bar.
8) Run the hydraulic power supply for at least 6 hours. Vary the flow rate and pressure to thoroughly flush all chips and dirt into the filters. Monitor for leaks and repair.
9) Replace the flushing filter elements with the elements removed in step 4.

1-5-15. CONTAMINATION CONTROL

Long term trouble free operation with a minimum of unplanned down time and adequate oil contamination control are linked very closely. It is very important to maintain adequate oil cleanliness. The addition of a system contamination control filter will control oil contamination levels at minimum expense.

The filter should be located such that the flow through the filter is relatively constant and at a low pressure. The junction of the return lines from the tooling actuator and the system relief valve is a suitable location.

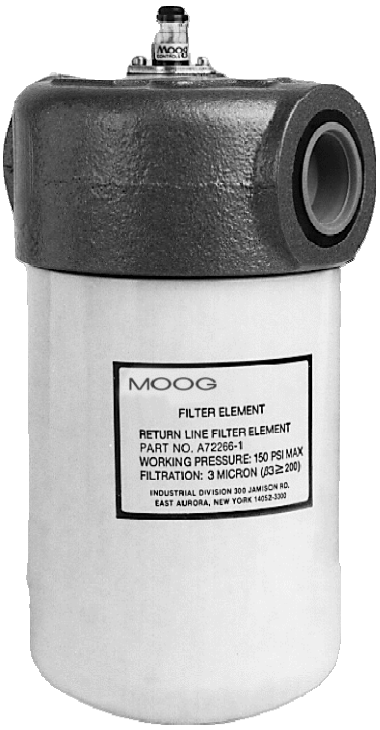


Figure 1-16 Flow Pressure Filter

DigiPack Ⅱ Manual, Installation and Maintenance

1-6. ELECTRICAL INSTALLATION

1-6-1. GENERAL

Electrical installation includes several phases of work:

A) mounting the DigiPack Ⅱ in a suitable location
B) determining the correct phasing so the servovalve, tooling position transducer and, possibly, accumulator position transducer may be connected to the DigiPack Ⅱ
C) determining the blow molding machine interface interaction with the DigiPack Ⅱ and then wiring the machine-DigiPack Ⅱ interface
D) connect the DigiPack Ⅱ to electrical power supply from the stable 24VDC

DigiPack Ⅱ MOUNTING

The DigiPack Ⅱ must be mounted in a location free of vibration, with protection from the environment and most important, located in a position allowing the operator and setup man easy visual and physical access. It is recommended that the mounting be on a swing out panel allowing easy access to the front and back sides of the DigiPack Ⅱ.
Mounting information is shown in "*Figure 1-17*". Brackets providing simple panel mounting are included.

All wiring from the DigiPack Ⅱ must be shielded. The shield is to be grounded to the DigiPack Ⅱ ground at the DigiPack Ⅱ only Any other ground paths may cause damage.

1-6-2. TB-1, TB-2 WIRING

The wire size for TB-1 and TB-2 are able to use **AWG26 - 14**, and required using **Solder less Pin type terminal**
TB-1 provides the interface between the DigiPack Ⅱ and the servovavle, die gap sensor, accumulator position sensor. TB-1 also provides outputs to optional customer monitors MFB Valve current, EFB spool monitor, DCDT input voltage, Accumulator voltage, Position command, these signals can be select at setting display (See 2-4-8.). A schematic of TB- 1 is shown as "*Figure 1-19*" and TB-1 functions are outlined in the table, "*Figure 1-20*".
Phasing definitions for the servovalve, die gap position and accumulator position (if used) transducers are given in "*Figure 1-18*".
Some connections to TB-1 are shown in parenthesis, (), in "*Figure 1-19*". The parenthesis, (), indicate alternate connection possibilities result from particular directions of motion or phasing determined during the design of the mechanical installation. Phasing requires that a defined direction of motion of the tooling actuator will result from TB-1-1 being negative with respect to TB-1-2; that the output voltage of the die gap position transducer be positive or negative when the die gap is moving in a specific direction; and that the accumulator position transducer output voltage direction be defined when the accumulator is ejecting molten plastic into the die head. Terminal TB-2 is using the external power supply to isolate logic inputs, "*Figure 1-22*", TB-2 functions are outlined in "*Figure 1-23*".

1-6-3. COMMUNICATION AND SSI SNSOR WIRING

The DigiPack Ⅱ acceptable to use **SSI sensor** for core position feedback. And can be communicate with host computer by **RS422** or **Ethernet**. The connector is using 15pins D-Sub female type for SSI Sensor (connector name label "ENC IN"), 9pins D-Sub male type for RS422 (connector name label "RS422") and RJ45 socket type for Ethernet (connector name label "Ethernet"). Please refer to *Figure 1-17* for connector location. And connector pin assign see below list.

SSI sensor connector D-Sub 15pin Female "ENC IN"

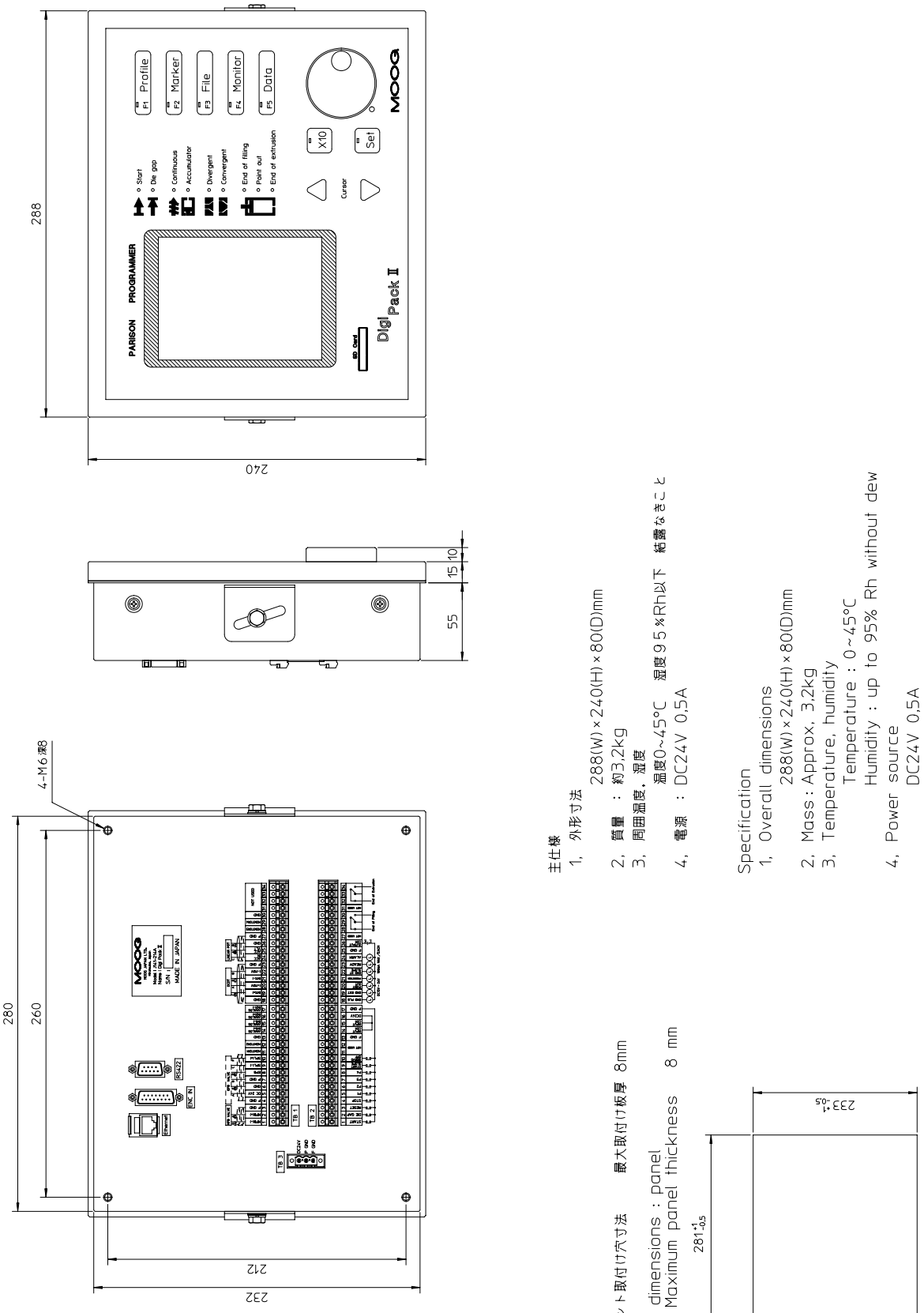
Pin No.	Signal	Connection
1	PULSE OUT+	Normal rotation Open collector output
2	PULSE OUT-	Inverse rotation Open collector output
3	GND	
4	+5V	5V Power out
5	GND	
6	EA+/DATA+	Encorder Phase A/SSI DATA
7	EA-/DATA-	Photocoupler Input
8	EB+	Encorder Phase B
9	EB-	Photocoupler Input
10	CLK+	SSI Clock out
11	CLK-	Line-driver Output
12	+24V	24V Power out
13	24V COM	
14		
15		

RS422 connector D-Sub 9pin Male "RS422"

Pin No.	Signal	Connection
1	TXD-	Differential send out
2	TXD+	
3	RXD+	Differentia receive in
4	RXD-	
5	GND	Connect to the Ground of machine side
6		
7		
8		
9		

Ethernet connector RJ45 socket "Ethernet"

Pin No.	Signal	Connection
1	TD+	
2	TD-	
3	RD+	
4		
5		
6	RD-	
7		
8		



主仕様
1, 外形寸法
288(W)×240(H)×80(D)mm
2, 質量 : 約3.2kg
3, 周囲温度、湿度
温度0~45°C 湿度95%Rh以下 結露なきこと
4, 電源 : DC24V 0,5A

Specification
1, Overall dimensions
288(W)×240(H)×80(D)mm
2, Mass : Approx. 3.2kg
3, Temperature, humidity
Temperature : 0~45°C
Humidity : up to 95% Rh without dew
4, Power source
DC24V 0,5A

パネルマウント取付け穴寸法 最大取付け板厚 8mm
Mounting dimensions : panel
Maximum panel thickness 8 mm

Figure 1-17 DigiPack Ⅱ Installation Drawing

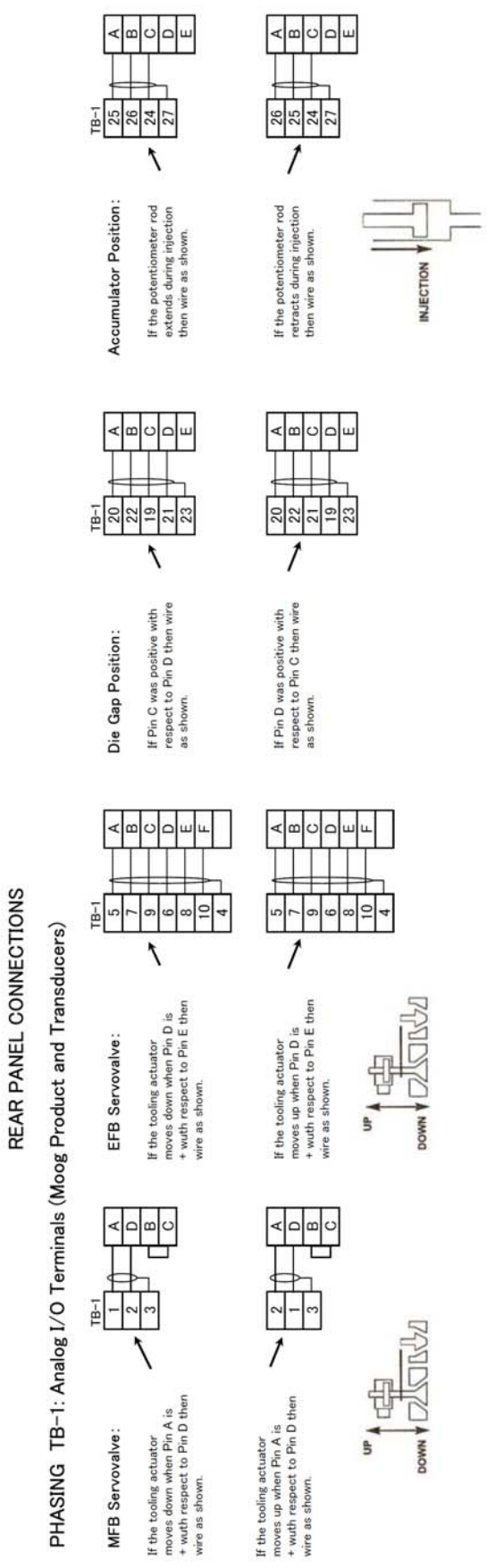


Figure 1-18 ServoValve and Transducer Phasing

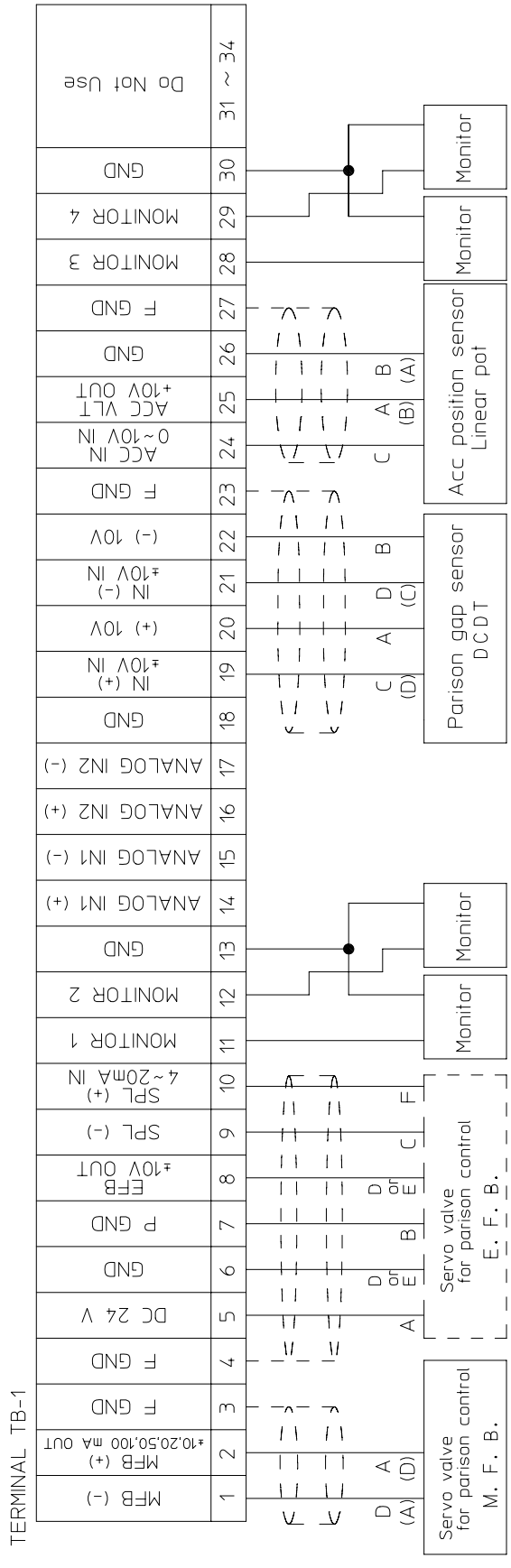


Figure 1-19 TB-1 Connections

TB−1: Analog I/O Terminals (Moog Production and Transducers)

Term No.	Name	Function	Comments	
1	−MFB Input	PinA or D, B to C, MEB Servovalve	(MFB)Mechanical Feedback	±10,20,50,100 mA
2	+MFB Input	PinA or D, B to C, MEB Servovalve	Connection A to D or D to A allow phase reversal	±10,20,50,100 mA
3	F GND(Cable Shield)	Cable Shield ground, MFB Servovalve	Do not ground the shield at the servovalve	
4	F GND(Cable Shield)	Cable Shield ground, EFB Servovalve	Do not ground the shield at the servovalve	
5	24 V DC	Pin A, EFB Servovalve	(EFB)Electrical Feedback Valve Power. Max 1.5A available	
6	GND	Pin E or D, EFB Servovalve	EFB Input Command (−)	
7	P GND	Pin B, EFB Servovalve	EFB Power Ground	
8	EGB	Pin D or E, EFB Servovalve	EFB Input Command (+) ±10 V IN	
9	Valve Spool (−)	Pin C, EFB Servovalve	Spool Position Monitor (−)	
10	Valve Spool (+)	Pin F, EFB Servovalve	Spool Position Monitor (+) 4−20 mA IN	
11	Monitor 1	Monitor Out 1	±10 V DC OUT. Signal selectable	
12	Monitor 2	Monitor Out 2	±10 V DC OUT. Signal selectable	
13	GND	Monitor Ground	Ground for Monitor 1 and 2	
14	Analog IN 1(+)	External Signal Input Channel(Not use)		
15	Analog IN 1(−)	External Signal Input Channel(Not use)		
16	Analog IN 2(+)	External Signal Input Channel(Not use)		
17	Analog IN 2(−)	External Signal Input Channel(Not use)		
			B63358 Tooling Actuator Connections →	
18	GND			
19	DCDT IN(+)	Pin C*; Blue**	±10 V IN	
20	+10 VDC Power	Pin A*; Red**	* 010−71670 DCDT, Phasing, as core moves	
21	DCDT IN(−)	Pin D*; Green**	** A31121−4 DCDT, to connector or Lead End	
22	−10 VDC Power	Pin B*; Black**		
23	F GND(Cable Shield)	Cable Shield ground, DCDT	Do not ground the shield at the Actuator or DCDT	
24	ACC IN	Pin 2, B8200 Potentiometer	0∼+10 V DC Input	
25	ACC VLT	Pin 1 or 3, B8200 Potentiometer	+10V DC Output	
26	GND	Pin 3 or 1, B8200 Potentiometer		
27	F GND(Cable Shield)	Cable Shield ground, Accumulator	Do not ground the shield at the Accumulator	
28	Monitor 3	Monitor Out 3	±10 V DC OUT. Signal selectable	
29	Monitor 4	Monitor Out 4	±10 V DC OUT. Signal selectable	
30	GND	Monitor Ground	Ground for Monitor 3 and 4	
31∼34	Do Not Use			

B63358 Installation Connections

MFB Servovalve

TB−1	Connector
1	A
2	B
3	Shield

EFB Servovalve

5	A
7	B
9	C
8	D
6	E
10	F
4	Shield

Die Gap Position

20	A
22	B
19	C
21	D
23	Shield

Figure 1−20 TB−1 Functions

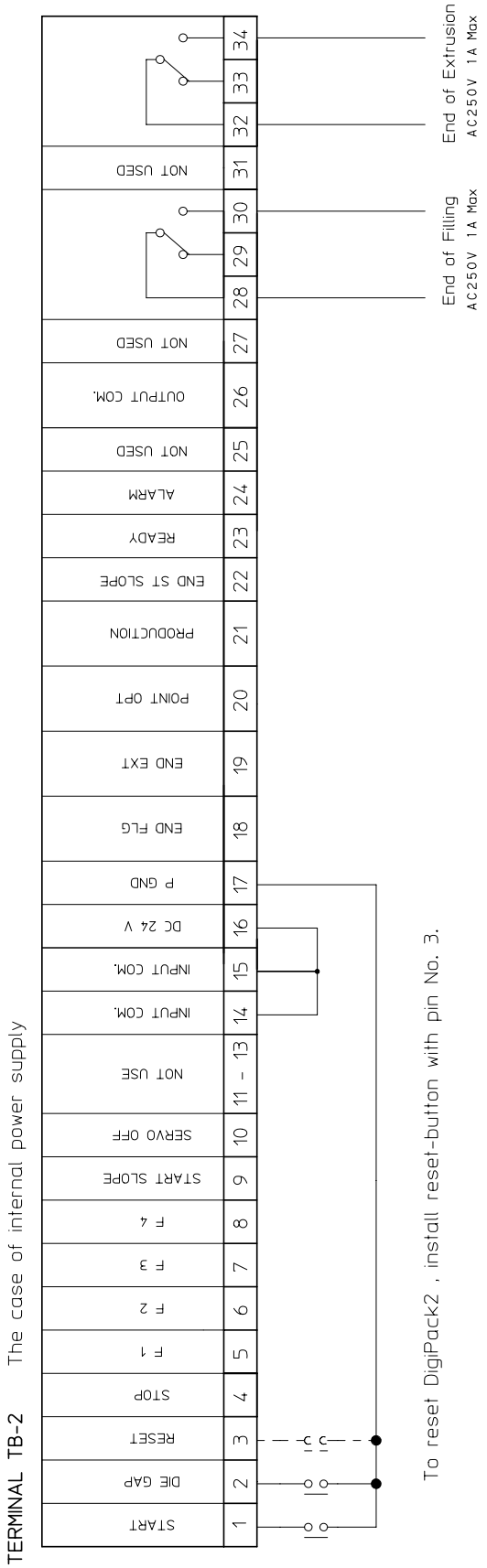


Figure 1-21 TB-2 Connection with Internal Logic Supply

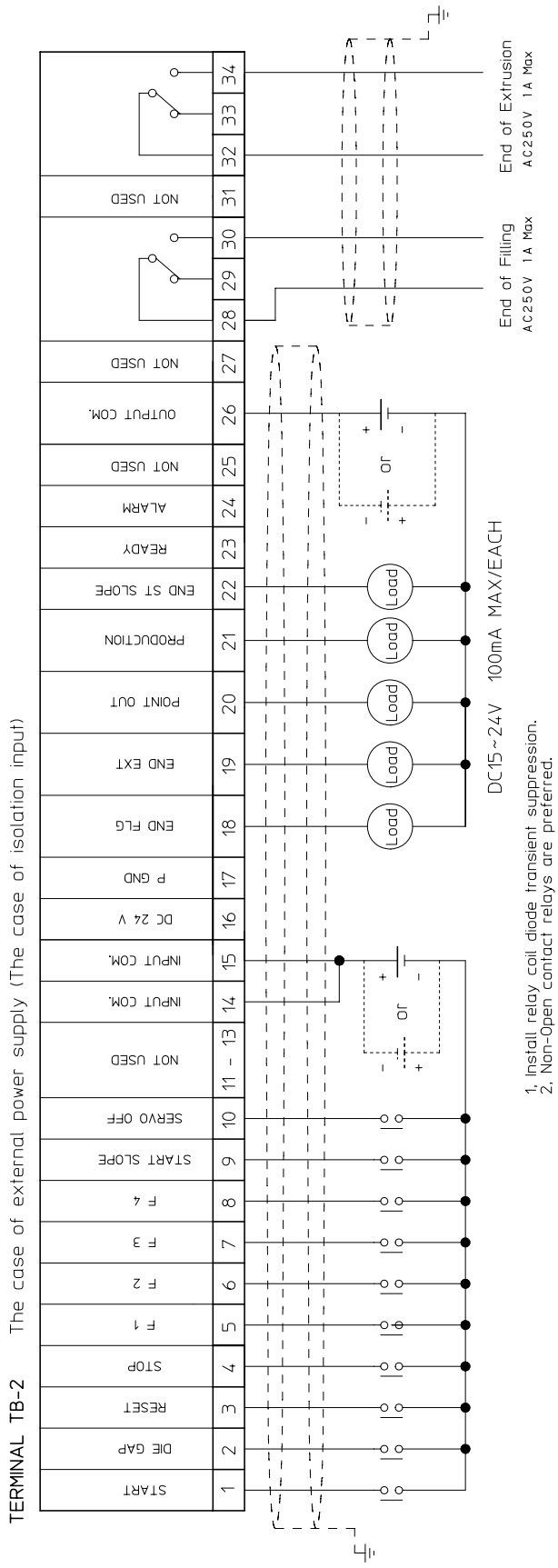


Figure 1-22 TB-2 Connection with External Logic Supply

TB-2: General I/O Terminals

Term No.	Name	Function	Comments Refer to Figure 1-18 and/or 1-19
1	IN1 START	Command for Cycle Start	Required (50ms min) to enable the START of each machine cycle
2	IN2 DIE GAP	Command to keep the tooling die gap at the set Die Gap value until IN1 START	Provides an independently set Die Gap when energized (50ms min)
3	IN3 RESET	Software reset terminal for Controller	
4	IN4 STOP	Command for Stop operation	Maintains program point die gap until START
5	IN5 F 1	Refer to Function Chart	
6	IN6 F 2	Refer to Function Chart	
7	IN7 F 3	Refer to Function Chart	See Function Chart on Page 24
8	IN8 F 4	Refer to Function Chart	
9	IN9 START SLOPE	Command to Start Slope	
10	IN10 SERVO OFF	Command for Servo off	To set Servovalve signal 0, and will be change to open loop mode
11 - 13	NOT USED		
14	INPUT COM.	Common + Isolation Input	Apply 24 V DC for IN1 - IN13
15	INPUT COM.	Common + Isolation Input	Apply 24 V DC for IN1 - IN13
16	DC 24 V	Power Supply 24 V DC	Output current 3.0A MAX
17	P GND	Power Supply Ground	Output current 3.0A MAX
18	END FLG	Signal output from End of Filling to receipt of Start signal	Pulse to stop accumulator filling
19	END EXT	Output signal at the End Of Extrusion	Max time, if reset by START, time will be shorter.
20	POINT OUT	Enabled MARKER output signal	Pulse Duration 30 msec
21	NOT USED		
22	END ST LOPE	Signal output from Start slope end until IN1 START	
23	RLEADY	Signal output when ready for IN1 START	While this output is ON, Machine can start profile.
24	ALARM	Not use currently	
25	NOT USED		
26	OUTPUT COM.	24 V DC	NOTE: I/O isolation is assigned by both positive and negative logic.
27	NOT USED		
28	EOF Relay COM	END OF FILLING Relay Common	Ref! (TB-2, 28) Do not use magnet contact relay directly
29	EOF Relay B	END Relay Contact B (NC)	Ref! (TB-2, 29) Do not use magnet contact relay directly
30	EOF Relay A	END Relay Contact A (NO)	Ref! (TB-2, 30) Do not use magnet contact relay directly
31	NOT USED		
32	EOE Relay COM	END OF EXTRUSION Relay Common	Ref! (TB-2, 32) Do not use magnet contact relay directly
33	EOE Relay B	END Relay Contact B (NC)	Ref! (TB-2, 33) Do not use magnet contact relay directly
34	EOE Relay A	END Relay Contact A (NO)	Ref! (TB-2, 34) Do not use magnet contact relay directly

Figure 1-23 TB-2 Functions

MOOG

1-6-4. TB-2 I/O CIRCUITRY

Input _____

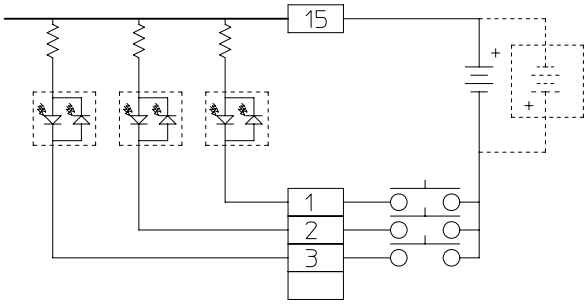


Figure 1-24 Input use external Power supply

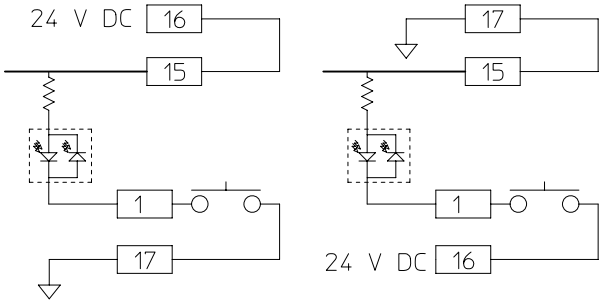


Figure 1-25 Input use internal Power supply

All DigiPack Ⅱ I/O can be uses both POSITIVE/NEGATVIE LOGIC

DigiPack Ⅱ can be used external and internal power supply. And provide isolated inputs.
The external power supply has an output 24VDC.

The contacts used must have very low contact resistance over a long life time.

Extreme care is required when wiring to insure that ground loops do not exist. Ground loops can cause damage to the DigiPack Ⅱ and other electronic equipment. Ground loops can also cause erratic operation of the entire blow molding machine.

Output _____

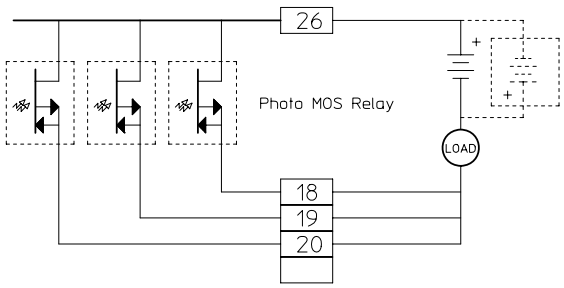


Figure 1-26 Output use external Power supply

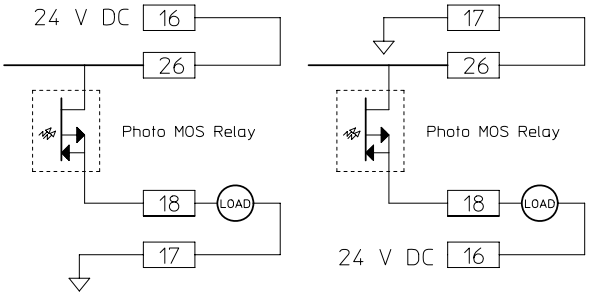


Figure 1-27 Output use internal Power supply

DigiPack Ⅱ's output circuits use Photo MOS Relay to provide isolation from the external circuitry.

An external power supply is required.

The maximum voltage and current output to each load terminal (TB-2, 18, 19, 20, 21, 22, 23 and 24) is 24VDC and 100 mA MAX/each.

Function Chart – Reference Terminal No's 5-8, TB2

IN5	IN6	IN7	IN8	Direction
H	H	H	H	No Movement (Use Front Keys)
L	H	H	H	Move to Profile (F1) Mode
L	L	H	H	Move to Marker (F2) Mode
L	H	L	H	Move to File (F3) Mode
L	L	H	L	Move to Monitor (F4) Mode
L	H	H	L	Move to Data (F5) Mode

"H" is the condition for which the Photo Coupler is **OFF.** Changing form the Monitor (F4) Mode to other Modes can only be done by using the function Keys on the front panel. The function Keys on the front panel are disabled if IN5 is in condition (L).

TB-3: Power Supply

Term No.	Name	Specification
DC24V	Power Supply 24V	24V DC Input 0.5A min – 3.0A max * Required install Fast blow Fuse. * No ripple required, Max +-10 %
P GND	Power Supply 0V	0V for DC 24V
F GND	Earth	

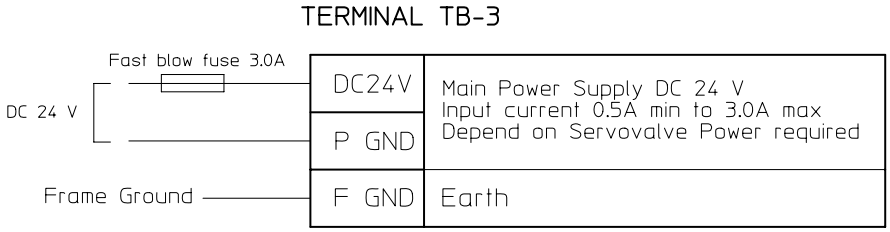


Figure 1-28 Power supply Connections

1-6-5. NOISE AND GROUND ISOLATION

In any location there is always the potential for electrical noise interference and multiple ground paths. Electrical noise can cause erratic system operation and is very difficult to find and isolate, ground loops also cause unexpected operation as well as burn out components. In addition, mains voltage stability can sometimes be questionable.

An isolation transformer between the mains and DigiPack Ⅱ can provide some relief from noise, ground loops and wandering mains.

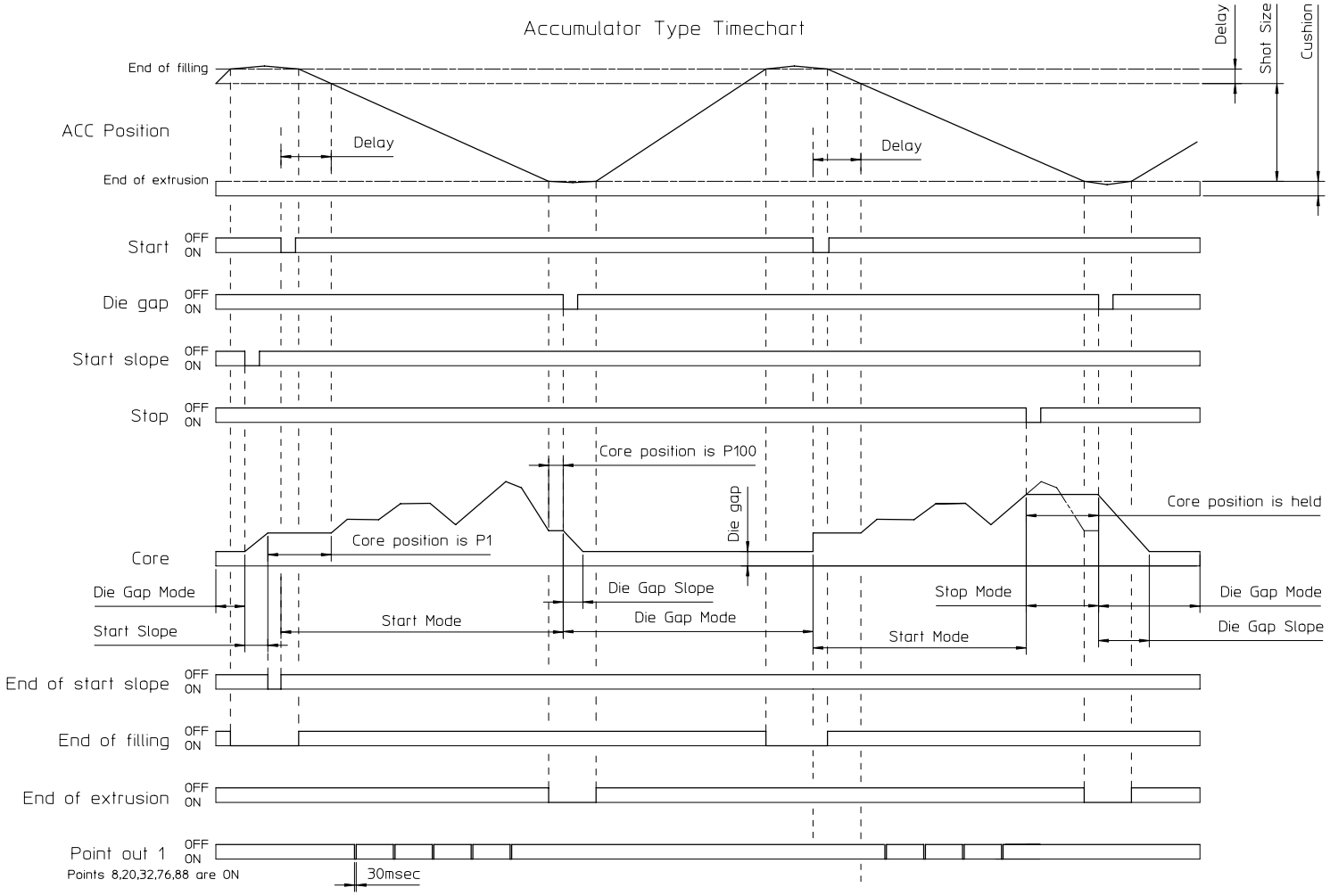


Figure 1-29 Accumulator Machine Timing chart

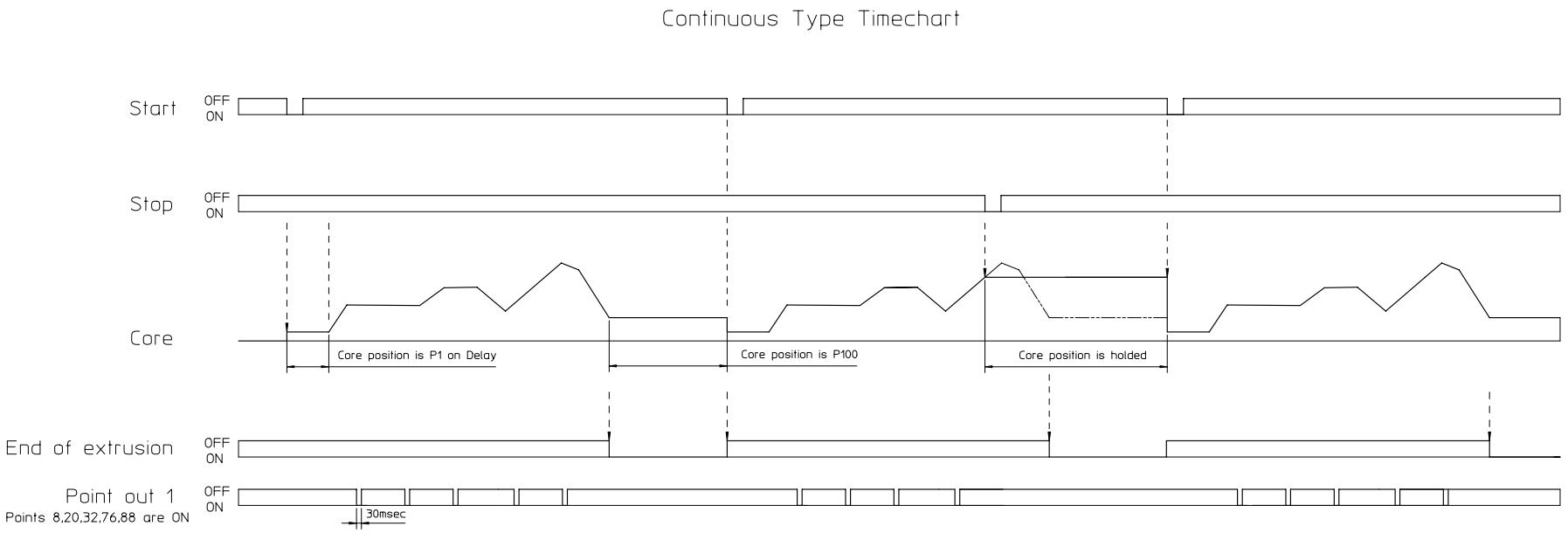


Figure 1-30 Continuous Machine Timing chart

1-7. TOOLING SYSTEM SETUP

1-7-1. GENERAL

The Mechanical and Electrical installation must be finished before the Dig Gap Tooling position control system can be set up. In addition the, hydraulic system must have been flushed for at least 24 hours.

The Die Gap Tooling position control system setup involves several steps:

1) The Machine setup in the DigiPack Ⅱ display (F4+Set) must be set to match various options determined by the blow molding machine and tooling head type.
2) The correct tooling type selection, Convergent or Divergent, must be determined. This will be determined by which portion of the tooling moves, the die or mandrel, as well as its internal shape.
3) The DigiPack Ⅱ must know if the blow molding machine is a Accumulator or a Continuous molding machine.
4) The working Die Gap end positions, closed and maximum open, must be set.
5) The responsiveness of the Die Gap Tooling position control system is measured and optimized.

When finished with the Die Gap Tooling system setup, the blow molding machine will be ready to be programmed for production containers.

The hydraulic pressure must be lowered during the setup procedure or the die gap tooling may be damaged.

1-7-2. MACHINE SETTINGS (F4+Set)

At the DigiPack Ⅱ display "F4+Set" ("*Figure 1-31*") is Setting for Machine setting. Set these parameters according to Machine type, these parameters should setting before start setting any parameter of tooling and accumulator. (Accumulator setting only accumulator machine)

The settings required now are:

1) Machine type – Either Continuous or Accumulator
2) Servovalve type – Either mechanical feedback, MFB, or electrical feedback, EFB
3) Valve current – If selected MFB type, this parameter can be selected current level 10, 20, 50 or 100 mA
4) Core sensor – Either DCDT or SSI
5) Output mode select – Either EFB/MFB or Pulse

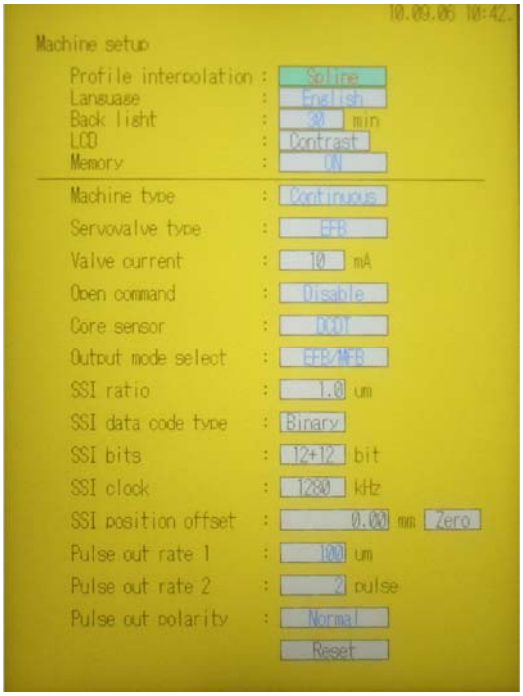


Figure 1-31 Machine setting display (F4+Set)

"*Figure 1-32*" defines all of the settings.

Function	**Setting**				**Setting**	
Profile interpolation	Straight				Spline	
Language	English		Chinese		Japanese	
Back light (min)	5	10			30	-- (no screen saver)
LCD	Contrast. Knob CCW : dark, Knob CW : bright					
Memory	ON				OFF	
Above 5 parameters are updated always						
Machine Type	Continuous				Accumulator	
Servovalve type	MFB				EFB	
Valve current (mA)	10	20	50	100	-- (not use EFB mode)	
Open command	Disable				Enable	
Core sensor	DCDT				SSI	
Output mode select	EFB/MFB				Pulse	
SSI ratio (um)	*If select DCDT sensor, do not set these parameter*				0.1 to 3276.7	
SSI data code type					Gray or Binary	
SSI bits (bit)					12+12 or 12+13	
SSI clock (kHz)					160/320/640/1280	
SSI position offset (mm)					-327.68 to 327.67 **Press "Zero" to set the current position to "0"V feedback.**	
Pulse out rate 1 (um)	1 – 32767					
Pulse out rate 2 (pulse)	1 – 32767					
Pulse out polarity	Normal				Reverse	
Above 14 parameters are update due to press "**Reset**" switch						

Figure 1-32 Machine setting Functions

"**Reset**" cursor must be push when the settings are changed. If not press "Reset", parameter changes back to original value when move to another display. When press the "Reset" DigiPack Ⅱ restarting automatically, please do not apply hydraulic pressure, when press "Reset".

1-7-3. MACHINE SETTING (F4+Set) FUNCTION

Profile interpolation	Sets a interpolation (*)Straight or Spline on the profile disply (F1)
Language	Language – ((*)English/ Chinese / Japanese) Sets the language used on the LCD Display
Back light (min)	Sets the timer of screen saver. 5, 10, (*)30 min or non screen saver.
LCD	Adjust the screen brightness. Knob CCW : dark, Knob CW : bright
Memory	Select actual feedback line indicated on profile display. (*)ON : Show, OFF : Not Show
Machine Type	Machine type – Accumulator or (*)Continuous
Servovalve type	Servovalve type – EFB or (*)MFB
Valve current	Valve current of MFB type – 10, 20, 50 or (*)100 mA
Open command	Cursor move admission to Open command on Monitor display (F4) Enable or (*)Disable
Core sensor	Core Sensor type – (*)DCDT or SSI
Output mode select	Select control target. (*)EFB/MFB: Servovalve, Pulse: Pulse train Servo motor drive.
SSI ratio SSI data code type SSI bits SSI clock SSI position offset	Sensor parameter of SSI type. ➢ Ratio (*)1.0 ➢ Code type (*)Gray ➢ Bits (*)12+12 ➢ Clock (*)160 ➢ Offset (*)0.00 * When press "zero", SSI position offset automatically updated, and set current position to "0"V feedback. (This change also required press Reset)
Pulse out rate 1	If Output mode select to "Pulse", needs to set this value. (*)1 This value is total distance of count set with Pulse out rate 2 Ex) rate1=10um, rate2=5puls, –> 5puls=10um.
Pulse out rate 2	If Output mode select to "Pulse", needs to set this value. (*)1 See Pulse out rate 1
Pulse out polarity	Set polarity of motion direction for Pulse train servo motor drive (*)Normal

Marked as (*) is initial setting with new DigiPack Ⅱ shipped.

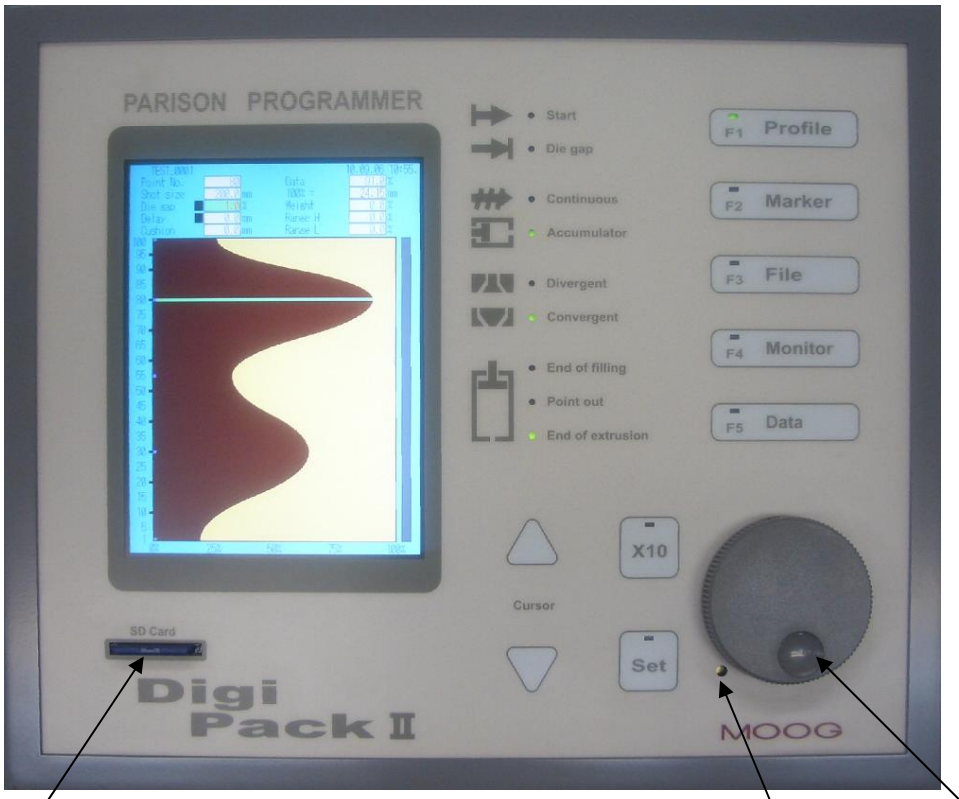


Figure 1-33 DigiPack Ⅱ Front Panel

1-7-4. DigiPack Ⅱ FRONT PANEL

OPERATIONS CONTROLS

The operator will setup and monitor the parison wall thickness program using the display, entry controls, function switches and Led's on the DigiPack Ⅱ's front panel, shown in "*Figure 1-33*"^,

All of the functions normally required to program the parison and machine are available on the front panel.

INPUT FUNCTION SELECTION AND VALUE

Entry Knob	Used to enter the value of various functions. Rotation in a clockwise
X10	Increases the sensitivity of the Entry Knob by a factor of 10
Set	Push to set value
Cursor	Used to scroll the items on the LCD in the direction indicated by the triangular shape

Highlighting is used to indicate the action FUNCTION or its VALUE to the operator. In "*Figure 1-33*" the value of Point No., 1 is highlighted as shown in this case highlighting indicates that the value of Point No. may be changed by rotating the ENTRY KNOB.

LED's (LIGHT EMITTING DIODEs)

The Led's are used to indicate the status of various functions as follows:

Start	Lights when the cycle Start signal is received.
Die Gap	Lights when the Die Gap signal is received and "DIE GAP" on the LCD is lit
Continuous	Lit when the "Continuous Extrusion" machine type is selected
Accumulator*	Lit when "Accumulator" machine type is selected
Divergent	Lit when "Divergent" die gap tooling is selected
Convergent*	Lit when "Convergent" die gap tooling is selected
End of Filling	Lights at the end of the accumulator filling stroke
Point Out	Lights when each Marker point is reached
End of Extrusion*	Lights at the end of the accumulator extrusion stroke (Cushion)

*LED is lit in "*Figure 1-33*"

FUNCTION SWITCHES

Used to select the Functions F1 through F5 shown on the LCD display. These functions are:

F1 Profile*	Controls the parison wall profile and other related functions
F2 Marker	Set the program point markers. And set the slope for goes to Die gap and start potion. And also Internal clock time setting.
F3 File	Controls the container wall thickness storage functions
F4 Monitor	Enables the I/O functions and indicates current value of servovalve input current and die gap position
F5 Data	Displays the profile point and related function data
F1+SET	SET UP Mode – Provides die gap tooling and other machine related set up functions
F2+SET	Signal assign to Monitor Analog output
F3+SET	Delete and Backup/Restore the storage data. (Backup/Restore for data in SD card)
F4+SET	Machine setting setup
F5+SET	Communication parameter setting RS422 and Ethernet. And Internal clock time setting

1-7-5. SET UP PROCEDURE

The mechanical and electrical connections are completely checked out, apply power to the DigiPack Ⅱ. Do not apply hydraulic power at this time.

The DigiPack Ⅱ LCD will light up and the F1 Profile appear after an interim screen. Then press F4+Set key to set the Machine setting to reflect language, servovalve type, machine type. The Machine settings made earlier may also be seen as the language used on the LCD, and the LED indicating either a Continuous or an Accumulator blow molding machine.

To go to Set Up mode press and hold F1 Profile and then press Set. The Set Up mode screen appears as shown in "*Figure 1-34*".

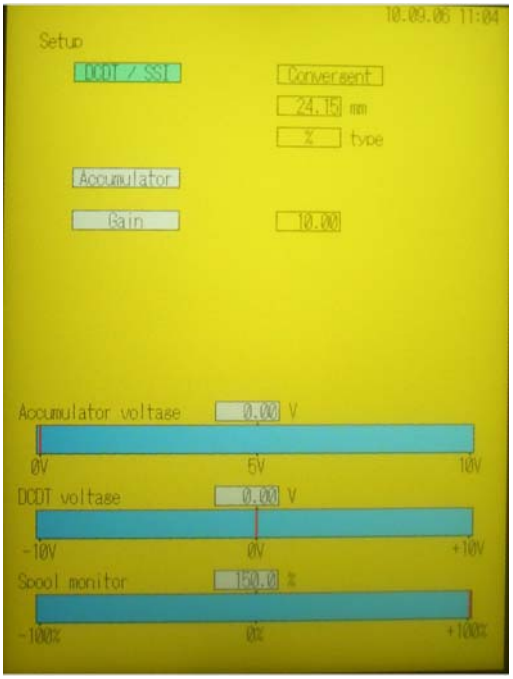


Figure 1-34 Tooling SET UP Mode

Three words appear on the left side of the screen, DCDT / SSI, Accumulator and Gain. The setup functions for DCDT / SSI, Accumulator and Gain are controlled by this screen. The highlighted word, in this case **DCDT / SSI**, indicates the setup screen to be accessed when SET is pressed. Note that. Accumulator will appear only when the Machine setting (F4+Set) are set for an Accumulator blow molding machine.
Each of the screens for DCDT / SSI, Accumulator and Gain has the word "**Back**" at the end of the setup procedure for that screen. Pressing SET when Back is highlighted will return the display to the SETUP screen.

1-7-6. DCDT / SSI SETUP

To access the DCDT / SSI setup screen, press SET. The screen shown in "*Figure 1-35*" will appear.

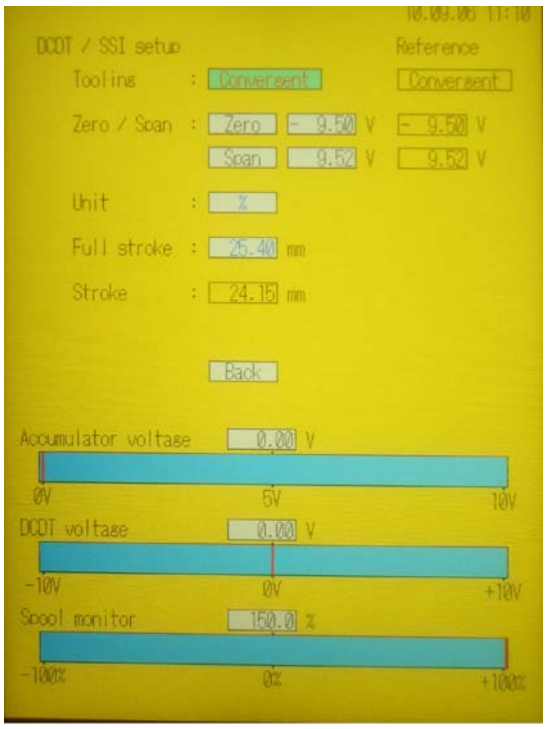


Figure 1-35 Die Converge/Diverge Setup

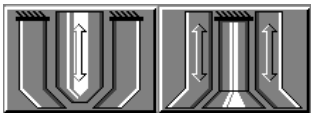
CONVERGE/DIVERGE SETTING

The selection between Converge and Diverge tooling designs implies that the selection between Converge and Diverge is a simple one. This is not necessarily true.

If the Converge or Diverge tooling uses a moving mandrel (inner part), then simply set Converge or Diverge as dictated by the tooling design.

However, if the Converge or Diverge tooling uses a moving die (outer part), then the other tooling type name must be used. For example, if the tooling design is Converge and the die is the moving part, the proper tooling selection for the DigiPack Ⅱ is Diverge. Example below.

Diverge



Converge

An alternate: if the tooling actuator moves in a downward direction to make thicker parison walls, then select Diverge. If the tooling actuator moves in an upward direction to make thicker parison walls, select Converge as the tooling type selection.

CONVERGE/DIVERGE SELECT

DCDT / SSI is highlighted. Press Set and the Tooling screen appears "*Figure 1-35*" with Converge highlighted. Select DIVERGE or CONVERGE by rotating the ENTRY KNOB in a cw or ccw direction. When the selection is made, push Set.

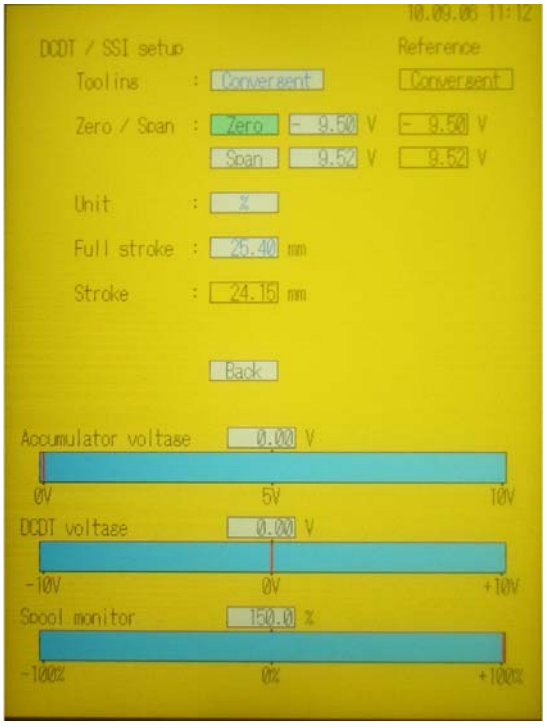


Figure 1-36 Die Gap Setup

"*Figure 1-35*" displays the currently set and file values of Zero and Span (arrows). The file values reflect may reflect a previous setup of a particular container which had been filed in the DigiPack Ⅱ's memory, using F3: File.
Note that similar information concerning other portions of the setup may appear in other screens.

CORE_____

In this screen, "*Figure 1-36*", under the heading Zero/Span, Zero is highlighted. Zero is the Die Gap closed position. If the tooling installation includes a Tooling Motion Stop then it must be temporarily positioned so the stop does not interfere with the tooling motion.

Note that the Valve current (or spool monitor) indicator may show a Valve current (spool position) indication that is continuously and rapidly moving back and forth over a band of as much as 25% of the indicated range. If there is a continuously moving indication of more than 3% then the Die Gap transducer connection to TB-1 should be changed to conform to the schematic show in "*Figure 1-37*".

Rotate the ENTRY knob to make the tooling move in the Die Gap closed direction. When the ENTRY Knob is turned, the Valve current indicator will move slightly and then return to zero or nearly zero when the ENTRY KNOB is stopped. The DCDT / SSI voltage indicator will indicate the changed Die Gap position.

Continue to move the Die Gap towards its closed position while watching the Valve current indicator. At some point the Valve current indication will not return to zero, but will increase with further rotation of the ENTRY knob, while the Die Gap does not change position. Increasing Valve current without Die Gap motion indicates that the Die Gap has closed (or has run into a motion stop).

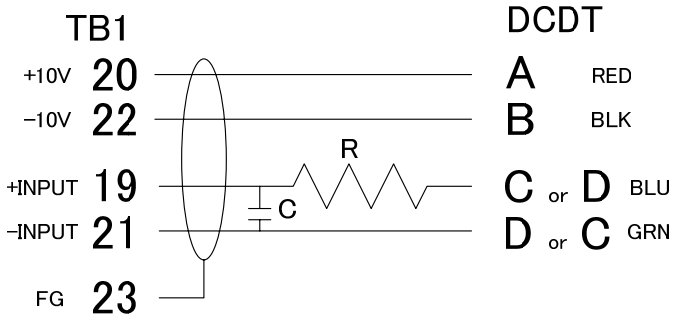


Figure 1-37 DCDT Noise Filter

ZERO

Then slowly rotate the ENTRY knob in the reverse (Die Gap Closed) direction while watching the Valve current indicator until the Valve current reaches Zero or the Die Gap indicator moves slightly.

Now turn the ENTRY knob in the original direction until the motion just stops and the Valve current indicator shows slightly increasing current. The Die Gap has just reached its closed position.

Push set. Install a dial indicator to indicate Die Gap position. Set the dial indicator to Zero.

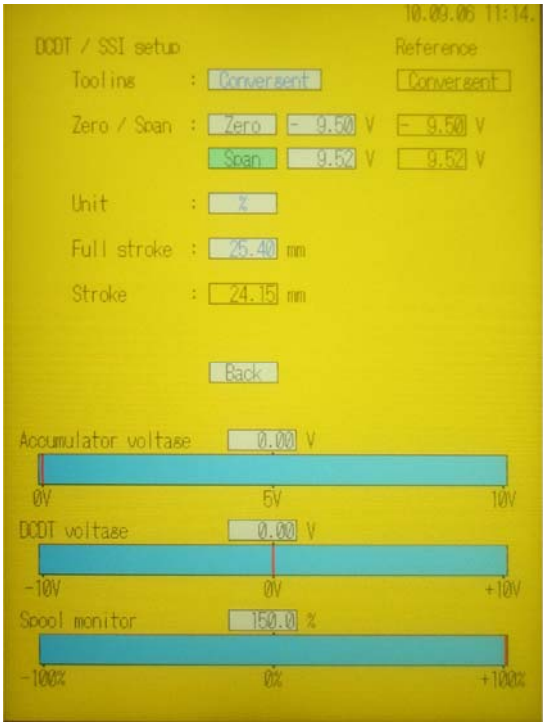


Figure 1-38 Die Gap Span Setting

SPAN

The LCD display has changed to indicate SPAN. "*Figure 1-38*" Span is the maximum Die Gap opening and is set, using the dial indicator, to the die gap tooling designers specified opening.

Open the die gap by rotating the ENTRY knob. Continue until the required die gap has been reached. Press Set.

UNITS and Full stroke

Press Set or Cursor Key (downward) at Zero/Span Span. Cursor moves to the Core Stroke Unit – either % or mm. % will give a die gap opening percentage reference where 100% equals the distance Stroke. mm will give the die gap opening directly in mm based upon the SPAN setting. Select the desired units using the ENTRY Knob and press Set. The value of **Full stroke** is set as DCDT / SSI full stroke length. (ex, ±10V=25.4 mm, Full stroke set to 25.4). The Stroke will automatically calculate from Zero/Span setting. Which mean 100%=Stroke (mm) showing die gap opening reference on any display.

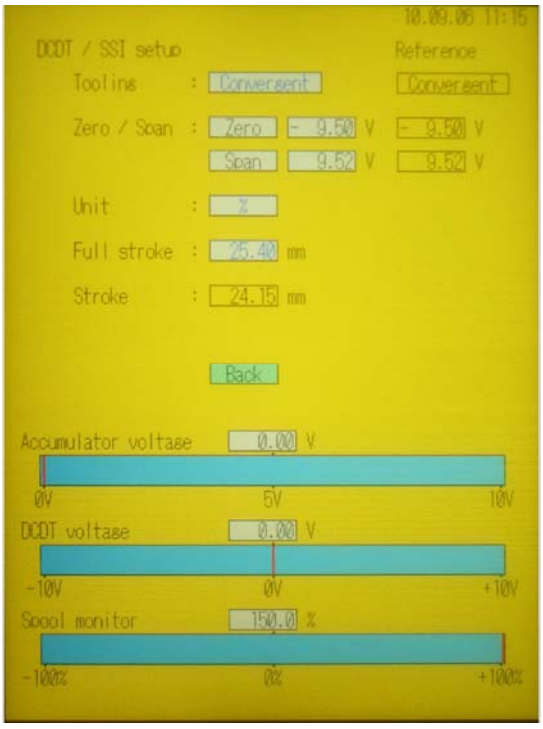


Figure 1-39 Back

Use the ENTRY KNOB to indicate the Stroke in mm.

Move to Back "*Figure 1-39*" and press set. The Setup Display is now shown.

1-7-7. GAIN SETUP

Use the Cursor to move to Gain. "*Figure 1-40*" and press SET. Gain controls the quickness and stability of the Die Gap Tooling Actuator. At this time the hydraulic pressure should be increased to its proper value.

Use the Cursor to move down to MOVE… Twist the ENTRY Knob back and forth and observe the DCDT / SSI voltage indicator. It should move back and forth, following the ENTRY Knob motion faithfully. If it seems sluggish, move back to the gain setting and increase Gain by 25% followed by Set. If it seems to be noisy, move to Gain, and decrease it by 25%, followed by Set. Continue until the response seems to be good and then move with the Cursor to Back and Set.

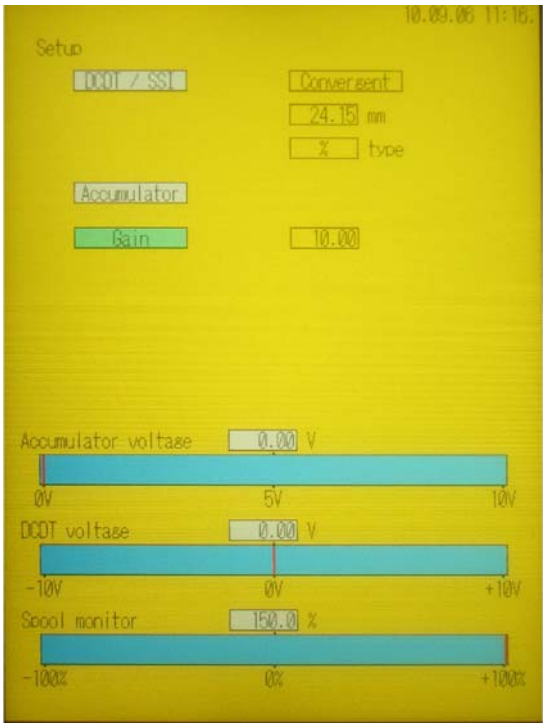


Figure 1-40 Gain

If an oscilloscope is available, connect the Y axis to TB-1, 19. Ground to TB-1, 21. Set the sweep to 0.5 sec/division and return to MOVE. Adjust the response to ENTRY knob motions until a damped response is obtained. Finish with Back and Set. This completes the SET Up for Continuous blow machines.

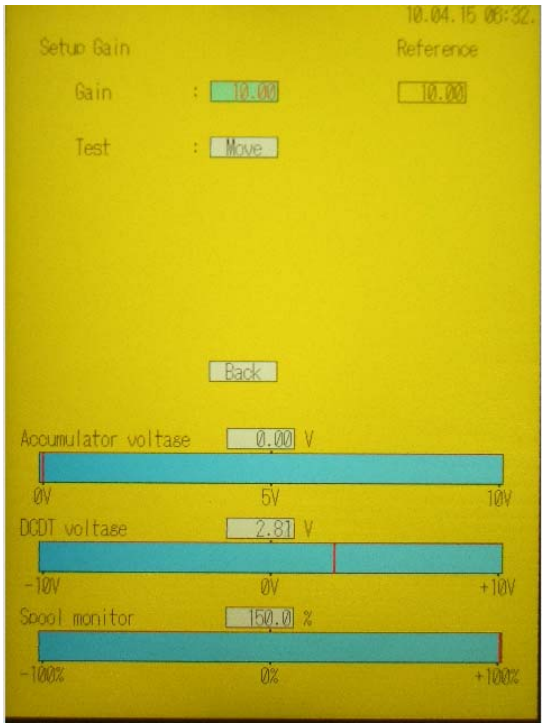


Figure 1-41 Die Gap System Gain Setting

A NOTE REGARDING CORE STROKE AND ZERO

The DigiPack Ⅱ features the ability to store the program information for individual containers as shown using a specific tooling head and mold. This is done to enable the customer to readily change between products with the expectation of a minimum change over time from the stop of production to the start of production of the new container.

1-7-8. ACCUMULATOR MACHINE SETUP

Setting up an Accumulator blow molding machine is very similar to the set up procedure for a Continuous blow molding machine. The only difference is the Accumulator position transducer calibration.

To enter the Setup Mode, press and hold F1 Profile and press Set. Then move to ACCUM. The Setup screen will appear as shown in "*Figure 1-42*".

The set up procedures for the DCDT / SSI, Zero, Span Core Stroke, and Gain etc. are the same as for a Continuous blow molding machine and must be completed before the accumulator can be set up.

After completing the initial tooling set up, press SET and the screen shown in "*Figure 1-43*" appears.

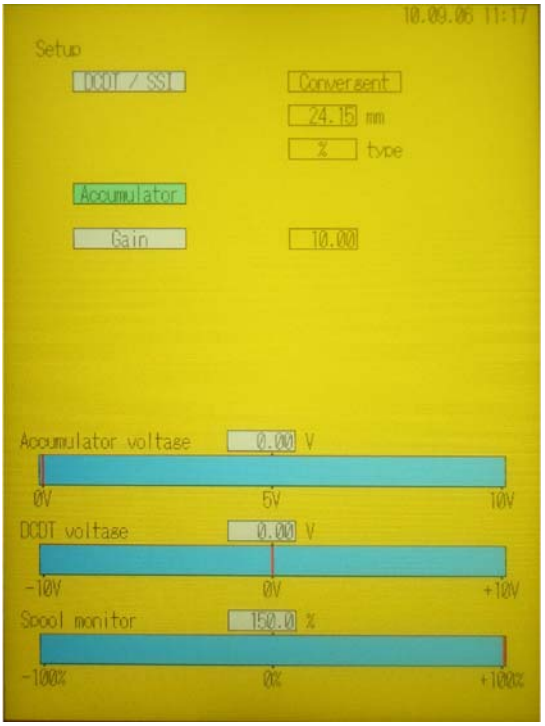


Figure 1-42 Accumulator Setup

EMPTY_____

The accumulator is now moved, using the blow molding machine controls, to its fully Empty position, where it should be totally empty of plastic using the following procedure:

1) "Start" signal is activated
2) The die gap tooling moves to 50% open
3) Adjust the tooling opening if necessary
4) Move the accumulator to its empty position
5) Push SET at the Empty position, the DigiPack Ⅱ will store the Empty position and turn on the "End of Extrusion" LED on. The Setup screen will now display Full "*Figure 1-44*"

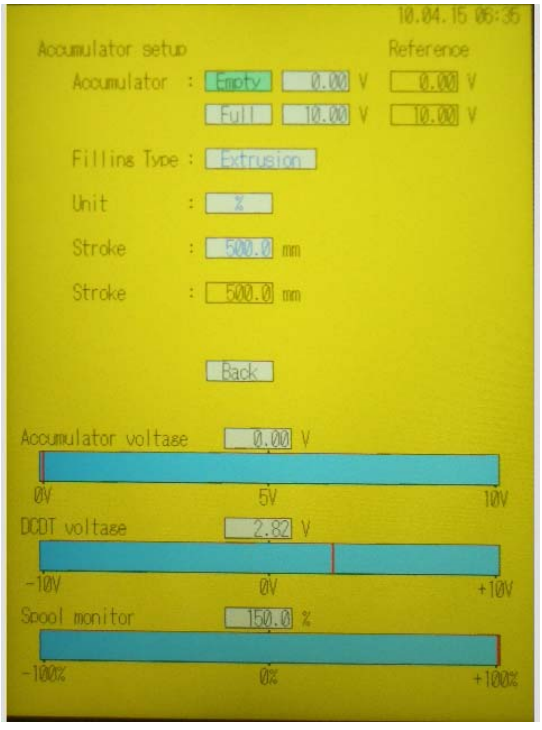


Figure 1-43 EMPTY Accumulator Set Up

FULL

The accumulator is now moved to its totally filled position, where it contains the maximum amount of molten plastic. This is the Full position. The procedure is:

1) "Die Gap" is activated
2) The die gap tooling moves to 5% open
3) Adjust the tooling opening if necessary
4) Fill the accumulator with plastic
5) Push SET at the Full position, the DigiPack Ⅱ will store the Full position and turn on the "End of Filling" LED

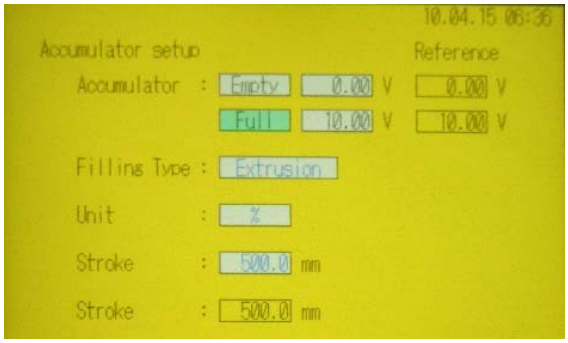


Figure 1-44 FULL Accumulator Set Up

The Empty and Full value cannot set same value, it is automatically set 0.2V space, if set same value e.g, Empty=5V and Full=5V, then automatically Empty set 4.8V.
And these two values can set only 0 to 10V. If set both 0V, value of "Full" change to 0.2V. And, if set both 10V, value of "Empty" change to 9.8V automatically.

Pushing SET also select the **Filling type** to Extrusion/Filling

Extrusion

Plastic extrusion to the container mold starts at the filled Accumulator position determined by the sum of Cushion, Shot size and Delay when Filling type – Extrusion is selected. End of extrusion is the Cushion position. "*Figure 1-45*" End of filling position is the Shot size stroke plus Delay stroke plus the Cushion stroke.

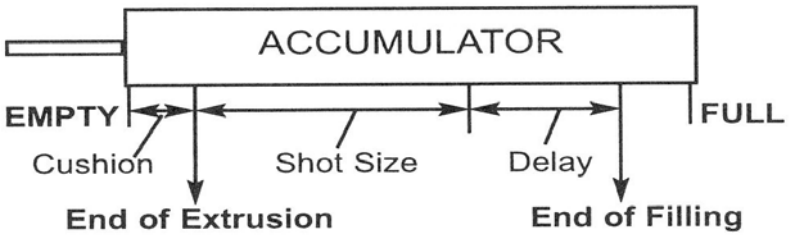


Figure 1-45 Extrusion Fixed

Filling

Plastic extrusion to the container mold starts at the Accumulator filled position (End of Filling) when FILLING FIXED is selected. The length of stroke is determined by the sum of SHOT SIZE plus DELAY. (*Figure 1-46*)
Select either EXTRUSION FIXED or FILLING FIXED and press SET.

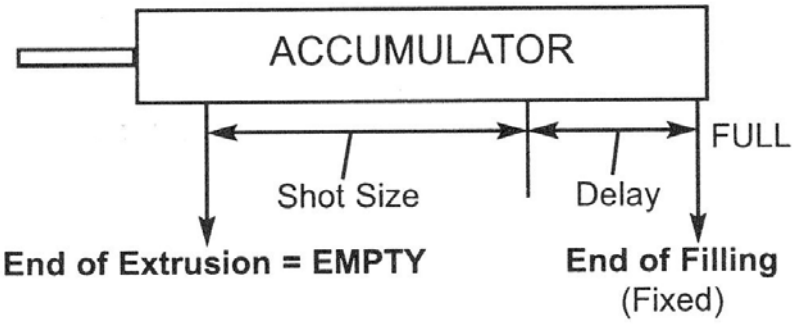


Figure 1-46 Filling Fixed

UNIT_____

Two UNITs are available, % or MM. The Unit selected will be applied to the following parameters: on the F1 screen:

SHOT SIZE
DIE GAP
DELAY
CUSHION

Select either % or MM and press SET

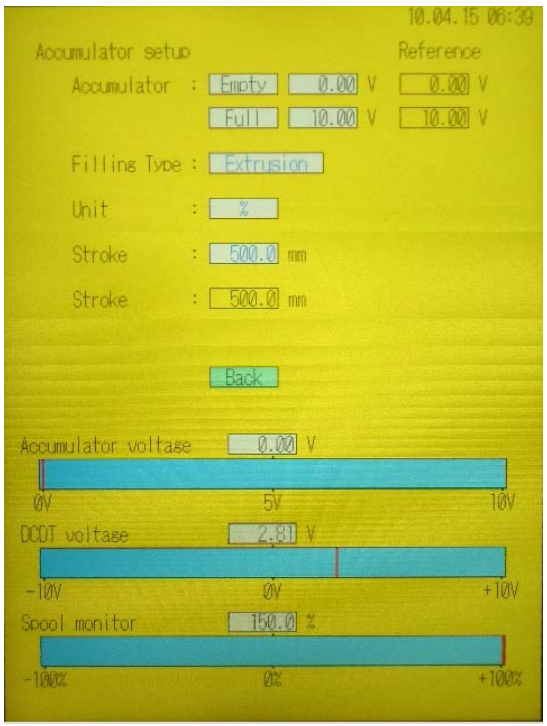


Figure 1-47 Extrusion Fixed, Filling Fixed, Unit, Accumulator Stroke and Back

STROKE_____

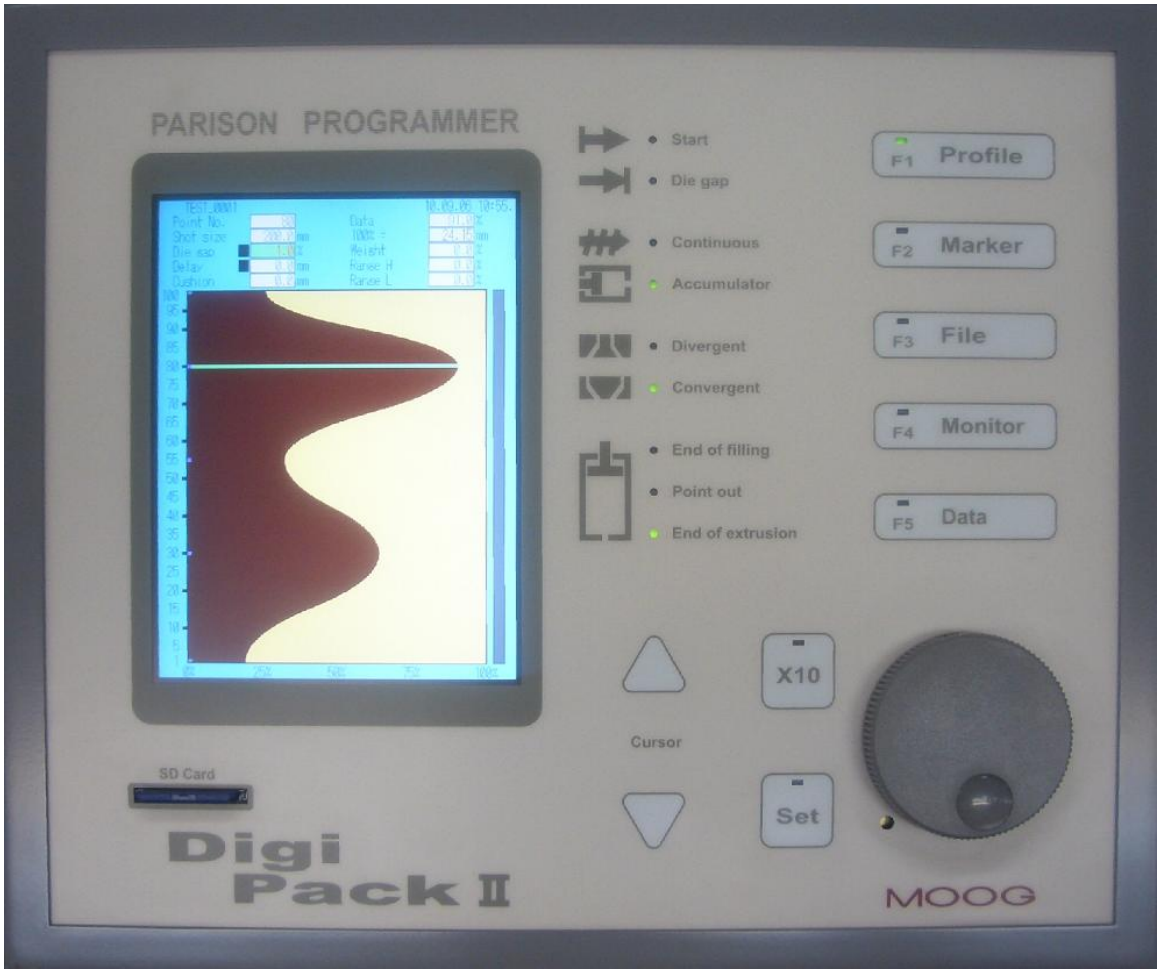
Use the ENTRY KNOB to indicate the length of accumulator Linearpot.
Full Stroke is set as Linearpot full stroke length. (ex, 0-10V=500 mm, Full stroke set to 500.0). The **Stroke** will automatically calculate from Empty/Full setting. Which mean 100%=Stroke (mm) showing Accumulator position reference on any display.

Press SET, Back is selected, press SET again to get to the SET UP screen.

The Accumulator blow molding machine set up process is now complete.

2. DigiPack Ⅱ Manual, User

2-1. INTRODUCTION



How do you program the DigiPack Ⅱ Parison Programmer? Its job is to allow you to easily program a plastic container that will meet your customer specifications for weight and strength.

This manual will provide information about the DigiPack Ⅱ's container wall thickness program setup procedure, its controls and information provided available on the front panel.

After a short learning period, you will be able to readily setup your blow molding machine to mold containers to their required specification.

2-2. PARISON CONTROL

2-2-1. HISTORY

Many different products are produced by the Blow Molding process. Any food, drug or toy store is filled with items using blow molded products. Many automobiles use blow molded windshield cleaning fluid. From a small beginning many years ago, the blow molding process has grown to a major industry.

The value of parison wall thickness control was recognized when the industry was young. Some of the early machines used two position hydraulic control of the die–mandrel gap. Others used heavy cams in strong structures to withstand the large forces involved. The first electro–hydraulic blow molding system replaced the heavy cams with light cams that were easy to modify. This was quickly followed by a readily adjustable electronic master cam used to determine the correct cam shape. Electronic interpolation then eliminated the cam. Today's parison programming systems provide reliable programming of parison wall thickness and in addition, may provide control of mold motion; screw speed; injection barrel heater temperatures, etc. or the capability to control all machine functions.

2-2-2. PARISON PROGRAMMING BENEFITS

Parison programming provides improved container quality, higher production rates and increased profits.

Control of parison wall thickness as a function of parison length results in constant container wall thickness after the parison is blown to conform to the mold.

Quality tests determine the ability of a container to withstand drop tests without bursting or leakage of its contents. Parison programming provides constant wall thickness throughout the container, insuring improved mechanical endurance at minimum weight.

Container wall thickness control reduces the container weight, eliminates the hot spots, resulting in decreased parison cooling time. The parison programmed blow molding machine's shorter cycle time results in increased production rates, combining with the decrease in material cost to ensure higher profits.

2-2-3. CONTINUOUS EXTRUSION MACHINES

A continuously rotating extruder screw pressurizes the granular plastic material, driving it through a heated tubular barrel. The resulting molten plastic is then extruded through the mandrel die gap, forming a continuous tubular parison.

As the parison never stops being formed, multiple molds are required to receive the parison in turn. One mold is in the cooling position, where the plastic cools until the container can stand alone when the mold is opened. The open mold has been moved to a position surrounding the parison, and when the parison is long enough, the mold is closed. The parison is then pressurized with air through the blow pin, causing it to

expand and take the shape of the mold walls, after which the mold is moved to its cooling position. The other mold is now open and is moved to the position where it surrounds the parison and the cycle repeats.

The machine and parison program cycle is started by the knife cutting the parison. Program start Delay time may be used to properly position the programmed parison profile relative to the mold profile to insure constant wall thickness.

2-2-4. ACCUMULATOR MACHINES

Accumulator blow molding machines are normally used to make large containers. Plastic is extruded into an accumulator until the amount required (Shot Size) to make the container is available. When the mold is positioned to receive the parison the accumulator piston moves, extruding the plastic through the programmable die gap to form the parison.

A position transducer measures the accumulator piston motion and causes the parison profile to be controlled as a function of the volume of plastic extruded through the die gap. During filling, the transducer also causes the accumulator to stop filling when Shot Size is achieved.

2-2-5. PARISON PROGRAMMING BENEFITS

If the die mandrel gap is constant, the extruded parison wall thickness is constant. When the parison is expanded by air pressure, it is stretched and made thinner. The resulting container walls contain thick and thin portions depending upon the amount of parison stretching occurring during the inflation of the container.

When this container is filled with a test fluid and dropped, it is likely to split in the heavy wall areas upon impact, due to reduced material strength resulting from uneven cooling stress. The entire container must be made thicker or more uniform to provide even cooling and improved strength.

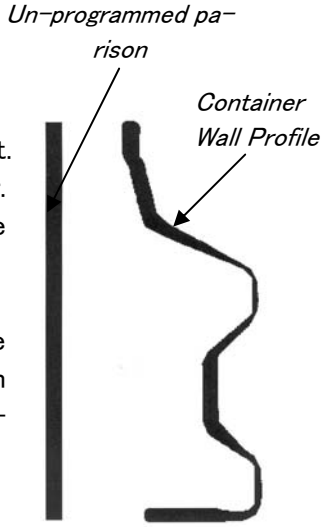


Figure 2-1 Section of an Un-programmed Parison and the Resulting Container Walls

As a result the container walls will be heavier throughout the container, require a long cooling time, material cost will increase and container production rates will decrease.

If the parison container thickness can be programmed as it is extruded by varying the die mandrel gap width, the resulting container will have constant thickness walls.

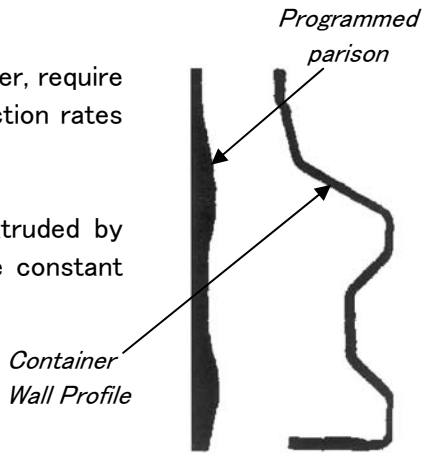


Figure 2-2 Section of a Programmed Parison and the Resulting Container Walls

This container will pass the drop test with less material as there are no heavy spots.

On average, the wall thickness will be less requiring shorter time to cool the container.

The container will have constant thickness walls.

This container will pass the drop test with less material as there are no heavy spots.

On average, the wall thickness will be less requiring shorter time to cool the container.

Programmed parison wall thickness control therefore results in higher container production rates using less material per container and higher profits.

2-2-6. WITH ACCUMULATOR BLOW MOLDING MACHINES

When used with accumulator machines, the DigiPack Ⅱ controls the parison wall thickness relative to the accumulator position as the plastic is being extruded. In this case the displays (LCD) vertical axis is accumulator position and the horizontal axis is die gap opening.

The total quantity or volume of plastic extruded is proportional to the accumulator position, then the resulting parison wall thickness at any given point on the length f the container is related to the accumulator position when that point on the parison was extruded through the die gap.

A potentiometer measures the accumulator position and controls the vertical axis of the program display.

The desired shape of the parison wall profile is commanded digitally by the operator using the display. The size of the tooling opening or die gap, as measured by a die gap position transducer, is compared with the operators commanded die gap opening as set on the DigiPack Ⅱ display.

The error between the operators commanded die gap opening and the actual position causes the servovalve to control the oil flow to the actuator and reduce the difference between the commanded and the actual die gap opening (position error) to a very small value. This feedback process ensures that the actual die gap opening follows the commanded die gap opening very accurately.

The operator can also set the accumulator working stroke, Shot Size, and the desired position at the end of the accumulator push out, Cushion, the DigiPack Ⅱ also provides interfacing signals for these functions with the machines PLC, which then controls the motions of the accumulator.

2-2-7. WITH CONTINUOUS BLOW MOLDING MACHINES

When used with continuous blow molding machines, the DigiPack Ⅱ controls the parison wall thickness relative to time required for one complete machine cycle. The displays (LCD) vertical axis is time and the horizontal axis is die gap opening. The cycle starts when the parison cut off knife cuts through the parison. Cycle end may be determined by a) the end of a fixed, operator set cycle time, b)the end of a time, automatic cycle time, calculate by repeated measurement of the times between parison knife cuts (the blow molding machine controls the cycle time) or c) sensing the end of a fixed time cycle and initiating a machine function such as closing the mold (the DigiPack Ⅱ controls the cycle time).

The desired shape of the parison wall profile is commanded digitally by the operator using the display. The size of the tooling opening or die gap, as measured by a die gap position transducer, is compared with the operators commanded position as set on the DigiPack Ⅱ display.

The error between the operator commanded position and the actual position caused the servovalve to control the oil flow to the actuator and reduce the difference between the commanded and actual die gap opening (position error) to a very small value. This feedback process ensures that the actual die gap opening follows the commanded die gap opening very accurately.

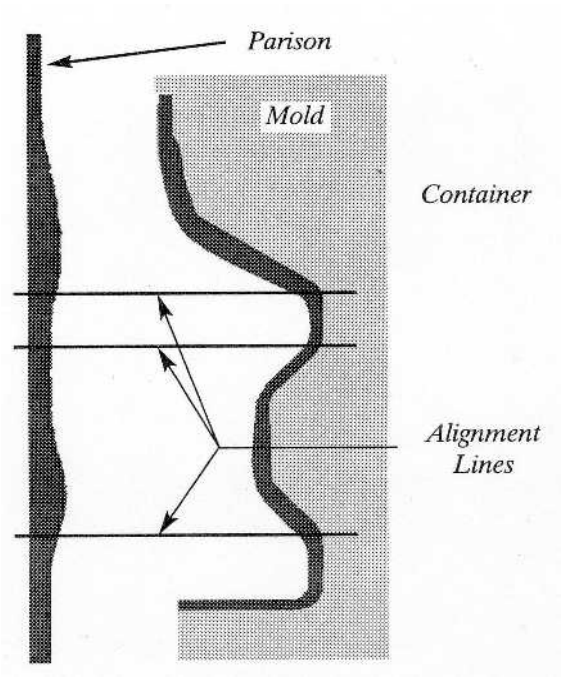


Figure 2-3 Poor Vertical Alignment Between the Parison and the Mold

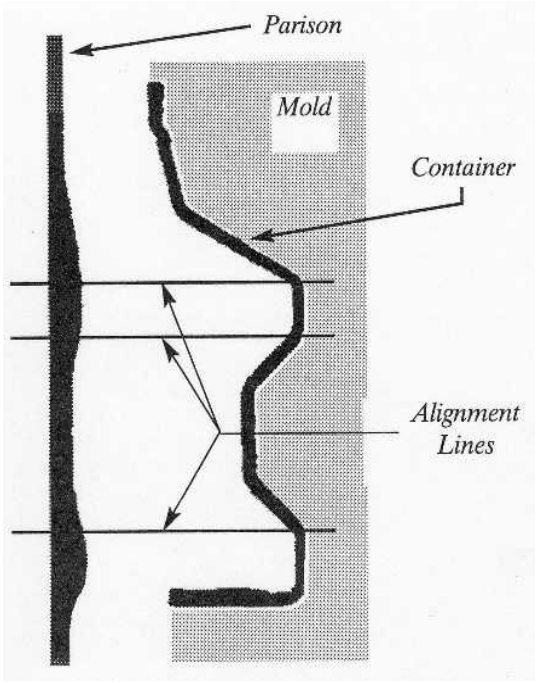


Figure 2-4 Good Vertical Alignment Between the Parison and the Mold.

2-2-8. PARISON MOLD ALIGNMENT

The Alignment Lines provide a reference line to indicate the parison thickness and the resulting container wall section after it is blown.

At the alignment lines, the parison is relatively thick and the mold circumference is large. When the parison is blown, the resulting container wall thickness as measured at the alignment lines is consistent with the wall thickness measurements of the rest of the container.

If the relative vertical alignment of the parison to the mold is poor, then the wall thickness will not be uniform throughout the container and the container must be scrapped.

Figure 2-4 shows the relative vertical position between the parison and the mold. The thicker portions of the parison are stretched by the blow air pressure to fill the portions of the mold with the greatest circumference. The act of programming the parison to have its thicker sections in vertical alignment with the portions of the mold with greatest circumference will produce a container with the desired constant wall thickness.

This effect is shown in *Figure 2–3* where the parison position is high relative to the mold.

The wall thickness profile of the parison is the same as in *Figure 2–4*. The alignment lines are in the same position relative to the mold as in *Figure 2–3*. Here the container wall thickness above both the upper and lowest alignment lines is too thick, and at the middle alignment line the wall is too thin.

As the parison position is moved down relative to the mold, the wall thickness consistency throughout the blown container improve until the correct results are obtained. Further parison movement will again result in poor wall thickness control.

It must be noted that horizontal alignment lines are shown as a tool to demonstrate the requirement for vertical alignment of the parison and mold. The actual motion of the plastic as it is blown and stretched is more complicated.

2-3. MAN MACHINE INTERFACE

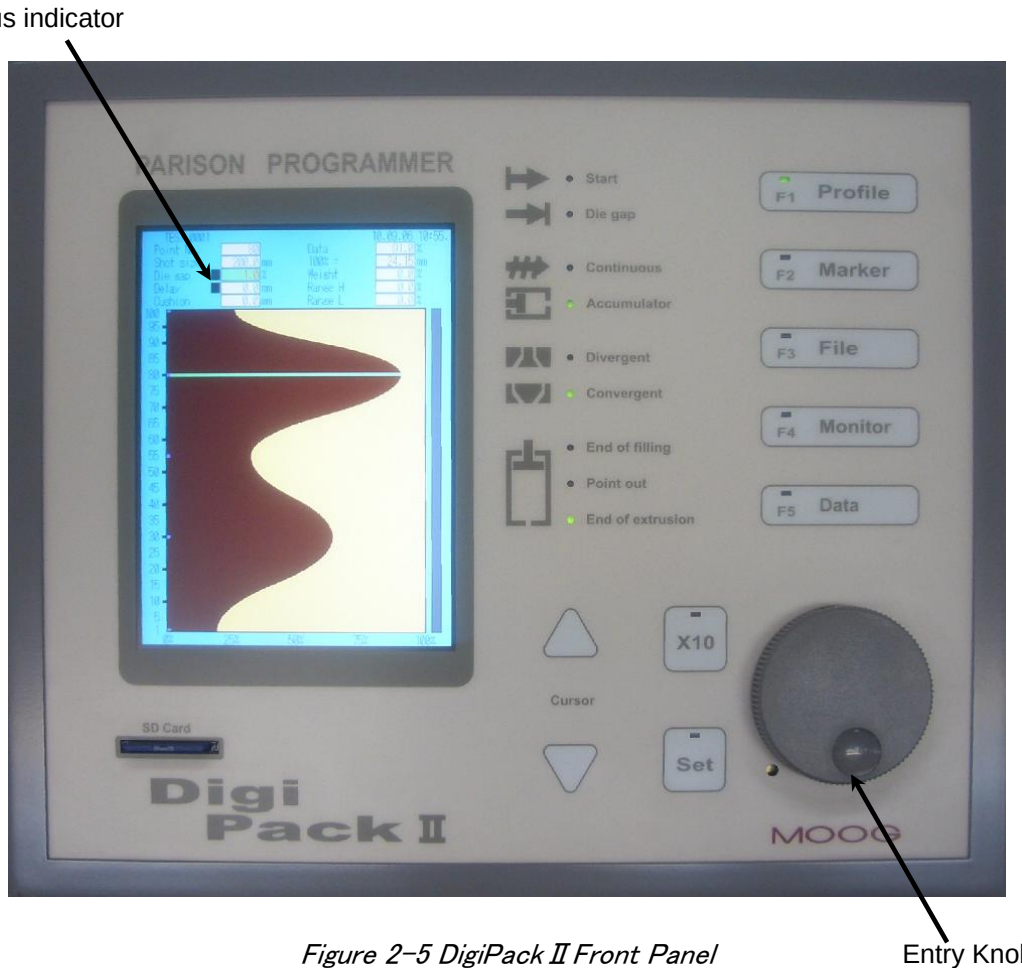


Figure 2-5 DigiPack Ⅱ Front Panel

DigiPack Ⅱ FRONT PANEL

2-3-1. OPERATORS CONTROLS

The operator will set up and monitor the parison wall thickness program using the display, entry controls, function switches and LED's on the DigiPack Ⅱ front panel, shown above in *Figure 2-5*.

All of the functions normally required to program the parison and machine are available on the front panel.

2-3-2. INPUT FUNCTION SELECTION AND VALUE

Entry Knob – Used to enter the value of various functions. Rotation in a clockwise direction will increase the function value.

X10 – increases the sensitivity of the Entry Knob by a factor of 10.

Set – Push to set Item values while the "SET" Led is flashing.

Cursor – Used to scroll the items on the LCD in the direction indicated by the triangular shape.

FUNCTIONS

Used to select the Functions F1 through F5 shown on the LCD display. These functions are:

F1 Profile*	Controls the parison wall profile and other related functions
F2 Marker	A program point marker is validated and also they are a slope and a time setup
F3 File	Allows storage and retrieval of 100 container wall thickness programs and related functions
F4 Monitor	Enables the I/O functions and indicates servovalve input current and die gap position values during machine operation
F5 Data	Displays the profile point and related function data
F1+SET	Set Up Mode – Provides die gap tooling and other machine related set up functions
F2+SET	Analog monitor assignment to monitor channels.
F3+SET	Delete and Backup/Restore the storage data. (Backup/Restore for data in SD card)
F4+SET	Machine primary setting setup
F5+SET	Communication parameter setting RS422 and Ethernet. And Inter clock time setting

LED's (LIGHT EMITTING DIODEs)

The Led's are used to indicate the status of various functions as follows:

Start	Lights when the cycle Start signal is received
Die Gap	Lights when the Die Gap signal is received and "DIE GAP" on the LCD is back lit
Continuous	Lit when the "Continuous Extrusion" machine type is selected
Accumulator*	Lit when "Accumulator" machine type is selected
Divergent	Lit when "Divergent" die gap tooling is selected
Convergent*	Lit when "Convergent" die gap tooling is selected
End of filling	Lights when the accumulator completes its charging stroke
Point Out	Lights when each Marker point is reached
End of extrusion*	Lights when the accumulator completes its empty stroke

*LED is lit in *Figure 2-5*

STATUS INDICATORS

Two status indicators are shown on the Profile page. (*Figure 2-5 DigiPack Ⅱ Front Panel*)

Running or Ready	Die gap and Delay are not highlighted
Die gap	Die gap is highlighted
Delay	Delay is highlighted

Status Condition

Running or Ready:

1) When the mode is changed from MANUAL to AUTO
2) When the power is turned on or the DigPack is reset
3) When the STOP signal is input
4) End of movement of the Delay to until Diegap signal ON.

Die gap: From DieGap signal and while core on the Die gap position

Delay: From Start signal and while Delay running

2-3-3. LCD (LIQUID CRYSTAL DISPLAY)

The LCD Display shows the detailed screen used when a particular Function is selected.

Selection of the individual Function Items is done by the **Cursor**. In *Figure 2-6 LCD Display*, the value of the Item **Shot Size**, 10.0 sec, is highlighted and therefore **Shot Size** is selected. Turning the **Entry Knob** will increase (CW) or decrease (CCW) the **Shot Size** value. To make this **Shot Size** change permanent, **Set** must be pressed. If **Set** is not pressed, then the value of **Shot Size** will return to its original value.

Selection of other Function Items is done by repeatedly pressing the Up or Down **Cursor** until the desired Item is reached. In this manner, all of the individual Function Items may be selected. The value of any Function Item will not be changed when moving between Function Items unless **Set** is pressed.
This input procedure applies to all Function screens.

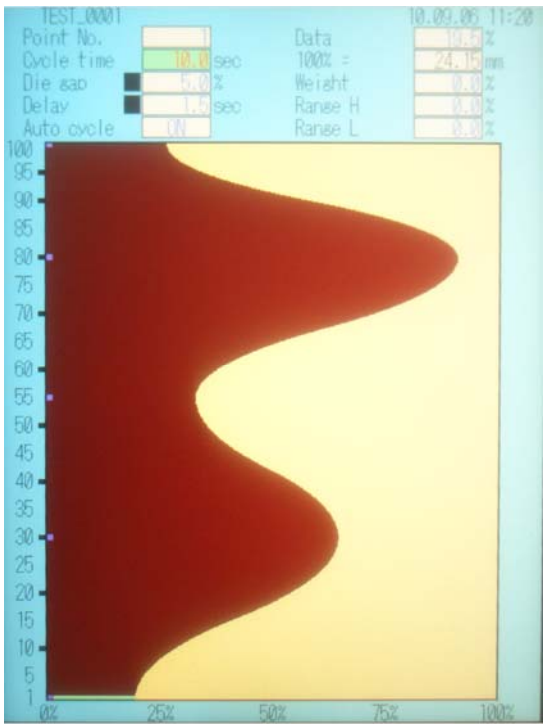


Figure 2-6 LCD Display

2-4-2. F1: Profile Mode

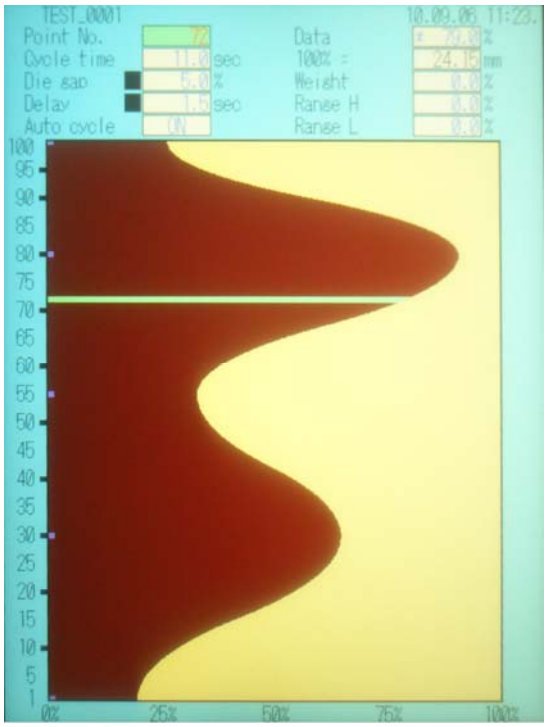


Figure 2-8 Profile Mode Screen

Mode obtained by pressing the **F1** Key.

Display

Normally displayed when manufacturing containers.

Profile Mode Function Items

Please refer to *Figure 2-8* and *Figure 2-13* for further definition information.

Die Gap Opening Profile

The profile uses 100 separate points to define the desired parison wall thickness profile. The horizontal axis of the LCD display is the programmed tooling die gap or parison wall thickness. The points along the vertical axis of the LCD display are Shot Size, either cycle time or accumulator stroke. Linear or Spline interpolation can be set at machine setup display (F4+Set) is used to define the profile between the operator set points. ＊ *Figure 2-8* showing Spline type.

Each profile point may be set to a value between 0% to 100% of the maximum tooling die gap opening by rotating the **Entry Knob** and pressing **Set.**

As shown in *Figure 2-8*, the active profile point on the display is indicated by a inverse video bar. Its value is shown on the upper right hand corner of the LCD display as "**DATA**･･･%"(79.0% on *Figure 2-8*). Points displayed as "＊" are interpolated values. If the value not displayed "＊" its settled program point, you can also see setting point with purple color line mark on profile left side as shown *Figure 2-8*.
If "－" is being displayed as a point value of left side of profile, that value has been set using **F2**: **Marker Mode**.

To cancel entered profile points, turn the Entry Knob counterclockwise until the display in the upper right hand corner of the LCD display indicates "**DATA**: ---.－" and press the **Set** Key.

The scale of the profile display will automatically change between 25%, 50%, 75% and 100% as required.

The following Function Items are found in the area of the LCD display above the parison profile.

Point No.

If the cursor placed on this value, the profile bar in the graph can be moved up and down by turn the **Entry Knob**, CW to move up and CCW to move down. Once decided cursor point on profile graph press **Set** key, and cursor move to **Data** value.

Data

If the cursor placed on this value, the profile thickness can be adjust increase and decrease by turn the **Entry Knob**, CW to increase and CCW to decrease. Once decided profile thickness on this profile point, press **Set** key, and cursor move back to **Point No.** value.

* The profile adjustment affected to next start cycle.

Shot Size

Shot Size sets the quantity of plastic used during one machine cycle to produce a container.

Accumulator Machines – the amount of plastic extruded by the accumulator or accumulator stroke. Shot **Size** is shown as a percentage (or mm) of the accumulator stroke and its value may only be set between 1% and 100%.

Continuous Extrusion Machines – the length of time for one machine cycle in seconds. **Cycle Time** may only be set between 0.1 and 999.9 seconds. This time is started by machine event, such as the motion of the knife cutting the parison.

An additional feature is **Auto Shot** which automatically sets **Shot Size** to be equal to the time interval between sequential knife cuts. If **Auto Shot** is ON then **Shot Size** automatically update each cycle interval, and **Shot Size** is no effect on the cycle time.

Die Gap

Die Gap sets the tooling die gap opening during the portion of the cycle between the end of the program profile (point 100) and the next cycle start. **Die Gap** may be set from 0% to 100% of the maximum tooling die gap opening. And if modified **Die Gap** parameter while Die gap condition (Die gap status indicator green), tooling die gap will move to changed position with die gap slope setting speed, when press **Set** key.

Die Gap is used to control the parison wall thickness for continuous machines and to close the tooling die gap to prevent drool for accumulator machines.

Delay

Delay delays the start of the programmed profile after the machine cycle is started. During this **Delay** the tooling die gap is maintained at the gap programmed by profile point 1. **Delay** may be set from 0% to 999.9% of the **Shot Size in ACC mode**. If Continuous Extrusion mode, **Delay** may be set from 0sec to 999.9sec

Delay is often used to synchronize the position of the initial programmed portion (bottom) of the parison with the bottom of the container mold.

Cushion

Cushion applies to Accumulator Machines and when filling type selected to Extrusion only.

Weight

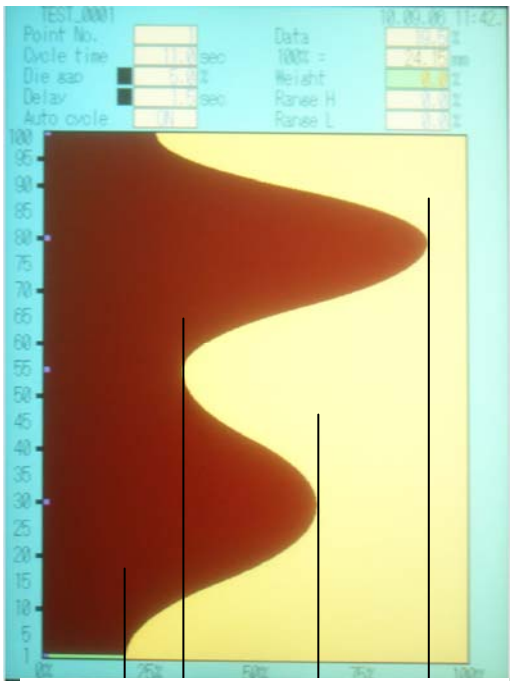


Figure 2-9 0%Weight Change

Traditionally, **Weight** is a constant value added to each profile point and when varied, has the effect of changing container weight roughly in proportion to the amount of weight change.

As used on the DigiPack Ⅱ, **Weight** produces a change proportional to the average thickness of the parison. For a given **Weight** change, the amount of change at each program point is related to the initial value of that point. The effect is to provide a container weight change with a minimal effect on the container wall thickness distribution. **Weight** is expressed as a percentage of the thickest point on the profile. **Weight** can vary from minus 100% to pluse 100%. Weight reduction can occur until the value of one of the 100 profile points reaches zero.

* If the profile over 100%, **Weight** still can be increase continuously up to 100%, however actual profile command is 100% maximum.

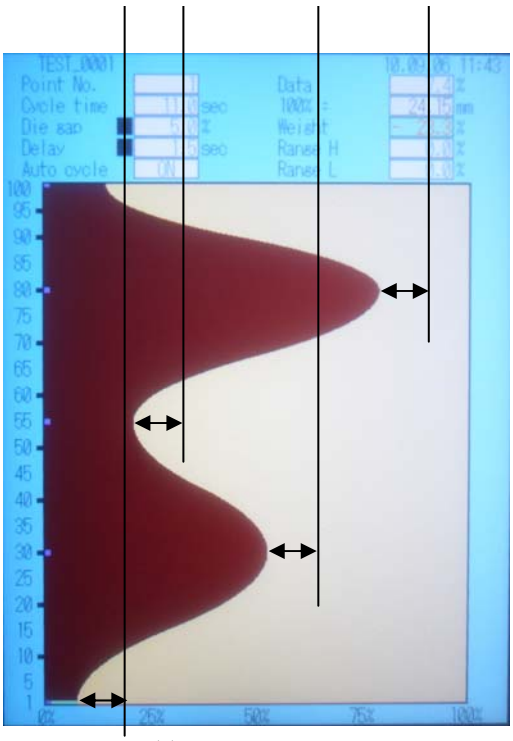


Figure 2-10 (-)23.3% Weight Change

Use the **Entry Knob** and **Set** to change the **Weight** setting. The percentage **Weight** change will remain displayed after being **Set**. When the **Entry Knob** is turned again the new **Weight** entry will start at zero using the current display as reference. If the **Entry Knob** is accidentally moved and the displayed **Weight** value changed, it will revert to its former value if **Set** is not pressed and the **Cursor** used.

When you start to generate the profile for a container for the first time, the **Weight** displayed will equal zero. After a **Weight** change has occurred, the **Weight** displayed will indicate the percentage **Weight** change.

Figure 2-10 shows the effect of a **Weight** reduction of -23.3% from the **Weight** value of 0% in *Figure 2-9*. To make the change easier to visualize, reference lines drawn between the figures starting at four different parison wall thickness program points have been included. The **Weight** change will be same from minimum to maximum parison wall thickness program point.

Range H

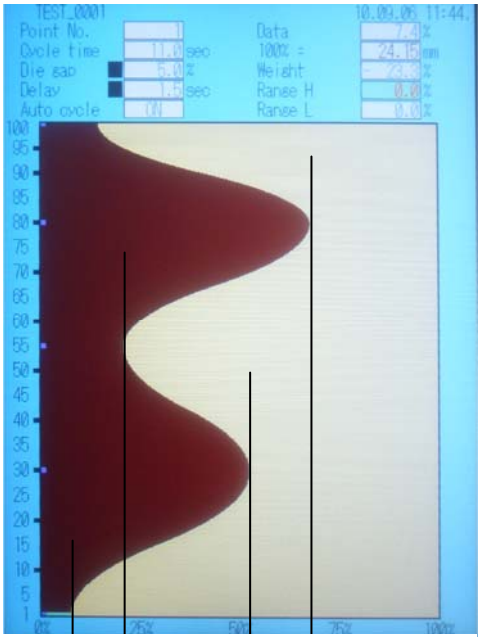


Figure 2-11 0% Range H

Range H changes the value of all profile points by a percentage of the difference between the thickness and thinnest points. The value of the thinnest profile point remains constant during a Range H change. Range H can vary between −100% and non limit + side (3276.7%).
* If the profile over 100%, **Range H** still can be increase continuously, however actual profile command is 100% maximum.

Use the **Entry Knob** and **Set** to change the **Range H** setting. The percentage **Range H** change will remain displayed after being **Set**. When the **Entry Knob** is turned again the new **Range H** entry will start at zero using the current display as a reference. If the **Entry Knob** is accidentally moved and the displayed **Range H** value changed, it will revert to its former value if **Set** is not pressed and the **Cursor** used.

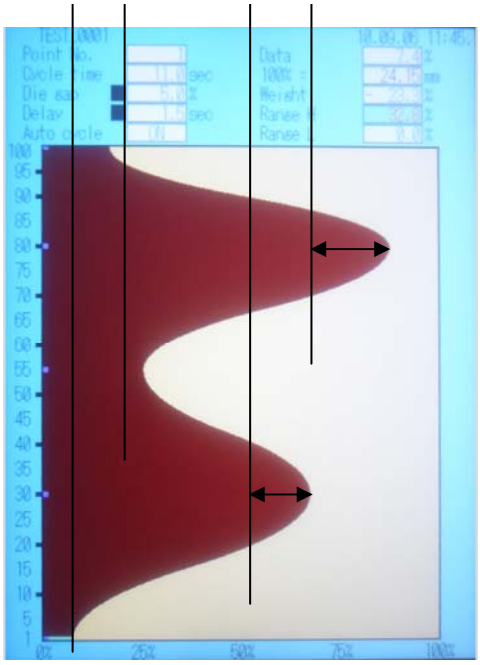


Figure 2-12 (+)32.8% Range H Change

Range H has the effect of allowing container weight changes while retaining the containers minimum wall thickness distribution pattern.

Figure 2-12 shows the effect of a **Range H** increase of +32.8% from the **Range H** value of 0% in *Figure 2-11*. To make the change easier to visualize, reference lines drawn between the figures starting at four different parison wall thickness program points have been included.

Range H will use the thinnest parison wall thickness program point as a reference and will not change its thickness. The **Range H** change will be largest at the maximum parison wall thickness point, and proportionately less at the intermediate parison wall thickness poins.

Range L

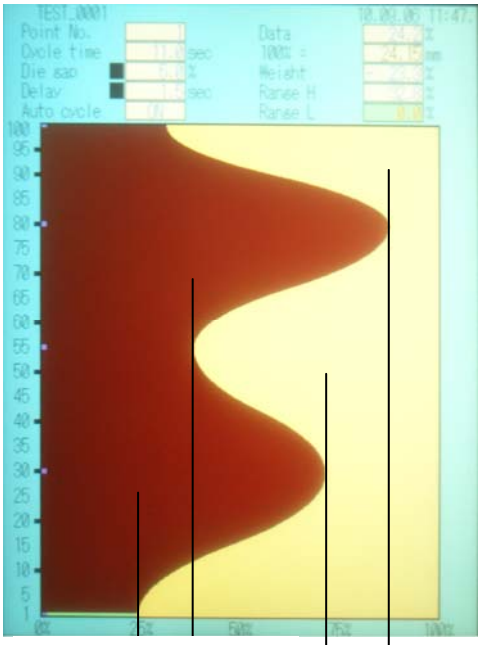


Figure 2-13 0% Range L

Thickest Point

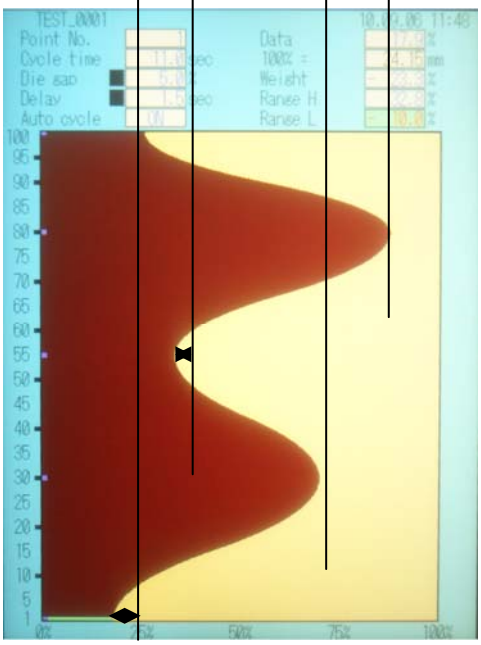


Figure 2-14 (-)10.0% Range L

Range L changes the value of all profile points by a percentage of the difference between the thickest and thinnest points. The value of the thickest profile point remains constant during a **Range L** change. **Range L** can vary between −3276.7% and +100%. **Range L** may be changed until the thinnest profile point reaches zero. Use the **Entry Knob** and **Set** to change the **Range L** setting. The percentage **Range L** change will remain displayed after being **Set**. When the **Entry Knob** is turned again the new **Range L** entry will start at zero using the current display as a reference. If the **Entry Knob** is accidentally moved and the displayed **Range L** value changed, it will revert to its former value if **Set** is not pressed and the **Cursor** used.

Range L has the effect of allowing container weight changes while retaining the containers maximum wall thickness distribution pattern.

Figure 2-14 shows the effect of a **Range L** decrease of −10.0% from the **Range L** value of 0% in *Figure 2-13*. To make the change easier to visualize, reference lines drawn between the figures starting at four different parison wall thickness program points have been included.

Range L will use the thickness parison wall thickness program point as a reference and will not change its thickness. The **Range L** change will be largest at the minimum parison wall thickness point, and proportionately less at the intermediate parison wall thickness points.

2-4-3. F2: Marker Mode

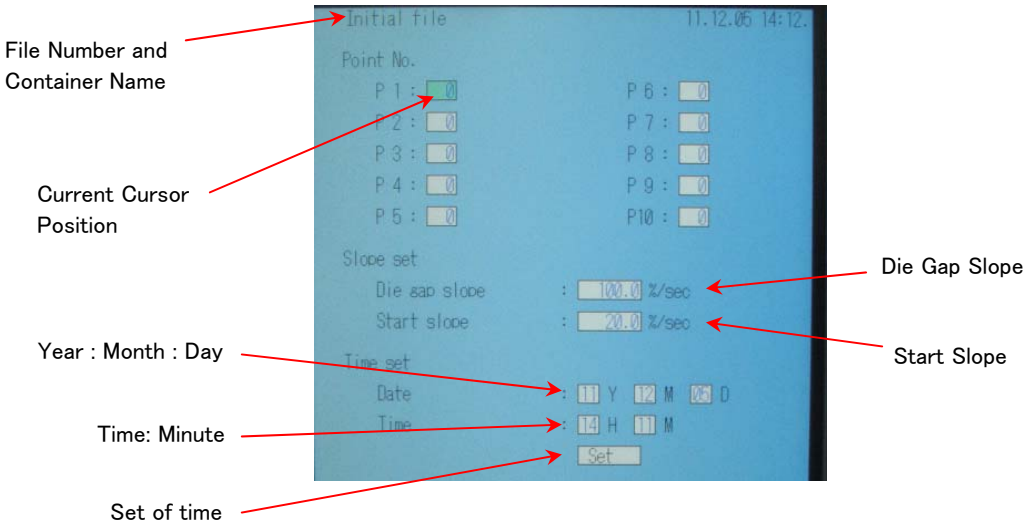


Figure 2-15 Marker Mode Screen

Mode is obtained by pushing the **F2** Key.

Display

Available when manufacturing containers.

Point No.

Set the profile point marker up to 10 points on the profile. To set these conditions, move from point to point using the **Cursor** Key and set point number with the **Entry Knob** and press **Set** Key to confirm. The value can be set from 0 to 100, and If set point number to "0", this mean not set this marker point.

Use

May be used to provide a pulse output occurring at a selectable point in the DigiPack Ⅱ cycle to control and/or synchronize machine functions or for other uses.

Die gap slope

The slope or velocity of the motion to the "Die Gap" setting position, when the Die Gap signal is given. Setting range is 0.1 to 999.9%/sec.

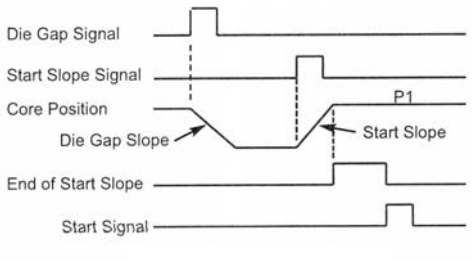


Figure 2-16 Slope Timing

Start slope

The slope or velocity of motion to Point 1 position, when the Start Slope signal is given. Setting range is 0.1 to 999.9%/sec. Valid only when the "Filling" status is indicated. See *Figure 1-29* and *Figure 2-16*.

Time set

A time setup of an internal timer is performed.
When there is no time correctly by an initial state or no long-term turning on electricity, time is set up on this screen.

Date

A date is inputted.

Time

Time is set up.

Set

After inputting a date and time, a timer is set up by set and a count is started.

2-4-4. F3: File Mode

Mode is obtained by pressing the **F3** Key.

Figure 2-17 F3: File Mode Selection Screen

Display

Available when manufacturing containers.

Function

This mode combines the profile, marker data and setup files and stores them in a Flash RAM or SD card for future use. To Flash RAM 100 files can be stored, and SD card can be saved data depend on the size of SD card. The data stored with identifying name of up to 32 characters, date and time.

Commands

When **F3: File Mode** is selected a choice **Load, Load SD, Save** or **Save SD**, is displayed (*Figure 2-17*). **Load, Load SD, Save** or **Save SD** can be selected, using the **Entry Knob** and **Set**.

When the Save or Load to/from SD card, SD card needs to insert SD card slot. If SD card is not in slot, below message occurred and can not continue file management.

"**SD card is not insert to slot or format is not correct**"

Note that if LOAD or Load SD is selected, the current container data file will be automatically overwritten. If the current container data file is to be stored, SAVE must be selected first.

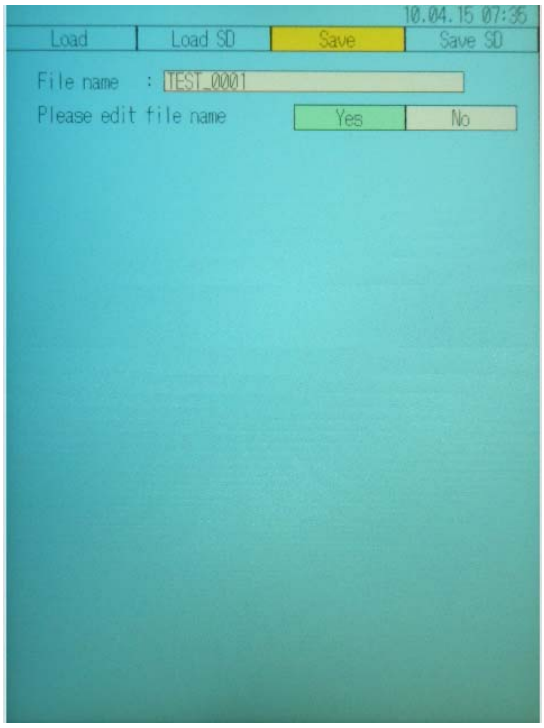


Figure 2-18 Select SAVE

Save or Save SD

Save or Save SD combines the profile data, function item data and point markers in one file and stores this file in the Flash RAM or SD card.

Use the **Entry Knob** to select **Save or Save SD** and press the **Set** Key. (*Figure 2-18*)

The prompt "**Please edit file name Yes/No**" is displayed. (*Figure 2-18*)
If you select "**YES**: then go to Page 62.
If you select "**NO**" then go to Page 61.

"Please edit file name Yes/No"

If you select "**No**" then follow the instructions below..
The LCD display (*Figure 2-19 – Figure 2-21*) shows the description of the file data, press Set at "**Next**" to see each display one by one.
To save the file, move cursor to "**Save**" with **Entry Knob** and press **Set** Key.
If you select "**Save**", the DigiPack Ⅱ saves the data in the Flash RAM (or to the SD card if you selected Save SD) and displays the save data in the **Profile** mode. (**F1: Profile**).
If you select "**Quit**" the first screen of the **F3 File** mode is displayed and no data is saved.

The data will automatically be saved in the "**FILE NO…**" file shown in the LCD display even if data is already stored there. In this case, the previously stored data will be lost.

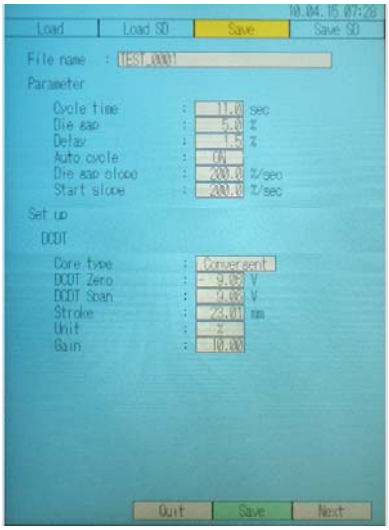


Figure 2-19 File Description Data-Page 1

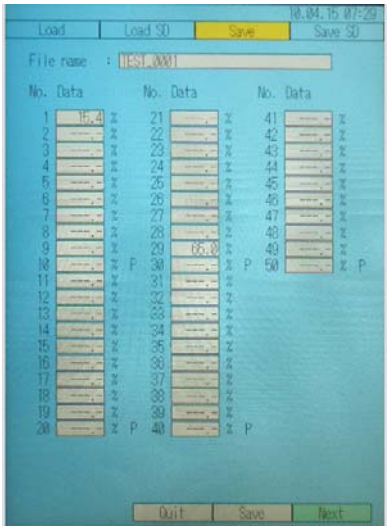


Figure 2-20 File Description Data-Page 2

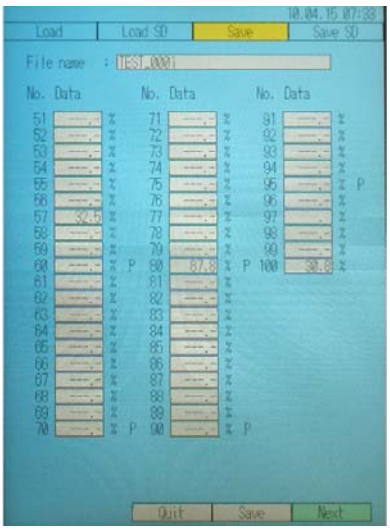


Figure 2-21 File Description Data-Page 3

"Please edit file name Yes/No"

If you select "**Yes**" Reference *Figure 2-22* and follow the instructions below….

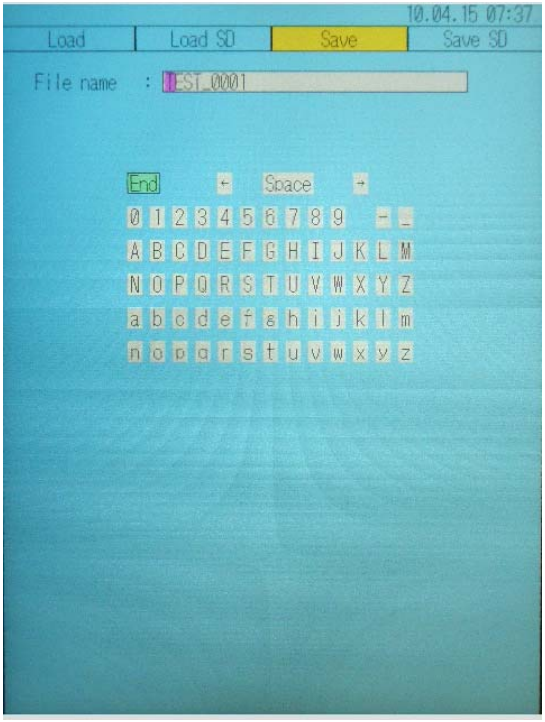


Figure 2-22 Edit File name

The LCD display changes to the Edit screen (*Figure 2-22*) and prompts '**File name**". Use the **Entry Knob** to name the file (32 characters maximum). The **Entry Knob** moves the display cursor from character to character. The **Set** Key enters the individual characters of the file name.

Special Characters

The "←" and "→" symbols are used to move the display cursor within the file name.

The last character in the list inserts a blank space in the name.

The "**END**" character is necessary for entry completion. "**END**" must be inserted at the end of editing or the new file will not be renamed. (If not change the name, skip to *Figure 2-19*)

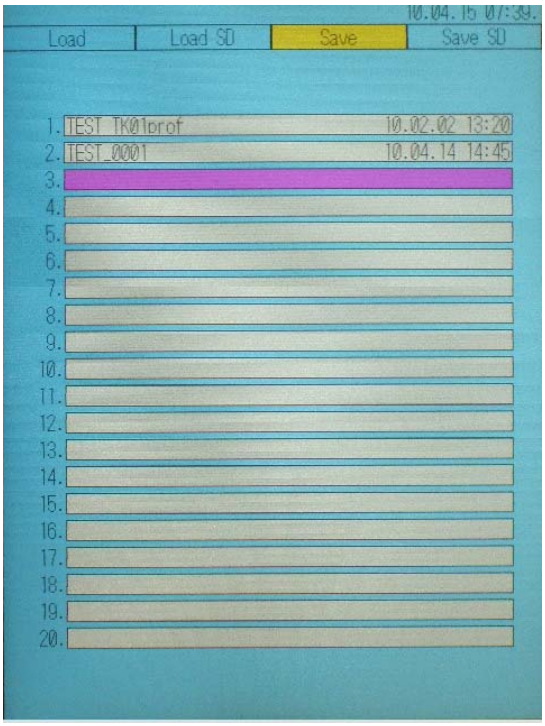


Figure 2-23 Change File Number

The LCD display changes to the File No. select screen (*Figure 2-23*) and prompts '**File No.**" Move to the desired file number by using the **Entry Knob** (selects in increments of 1) and the **Cursor** Key (selects in increments of 20). Press **Set** to enter.

After select file number, the LCD display changes to a description of the entry data (*Figure 2-19 – Figure 2-21*) with the "**Quit or Save or Next**" prompt displayed. If you select "**Save**", the DigiPack Ⅱ saves the data and displays it in **F1 Profile** Mode. If you select "**Quit**", you are returned to the first screen of the **F3 File** Mode and no data is saved.

Load or Load SD

If you select "**Load or Load SD**" (*Figure 2-17*), using the **Entry Knob** and **Set** Key. The file list is displayed, starting at "**No. 0 Initial file**" (*Figure 2-24*). In this mode, files 0 to 100 are displayed in blocks of 5. You can find the required file by using the **Entry Knob** (the display cursor moves through the files in order) and the Cursor (jumps files in blocks of 20) to find the desired file. Then press the **Set** Key.

Figure 2-25, is displayed at the bottom of the LCD display. Select "**Quit**" or "**Load**" or "**Next**" with the **Entry Knob** and **Set** Key.

If "**Load**" is selected the file loads and is displayed in **F1 Profile** Mode. If you select "**Quit**", the initial **F3 File** Mode, *Figure 2-17*, screen is displayed and no file is loaded.

If "**Next**" is selected, described other parameters.

Setup data (for example GAIN, DCDT Zero/Span, etc.) will be loaded only for reference because of the machine safety.

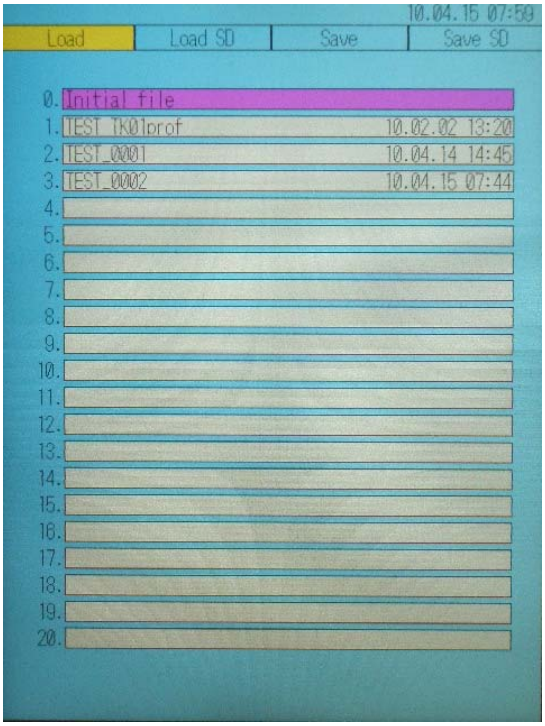


Figure 2-24 Initial Load Screen

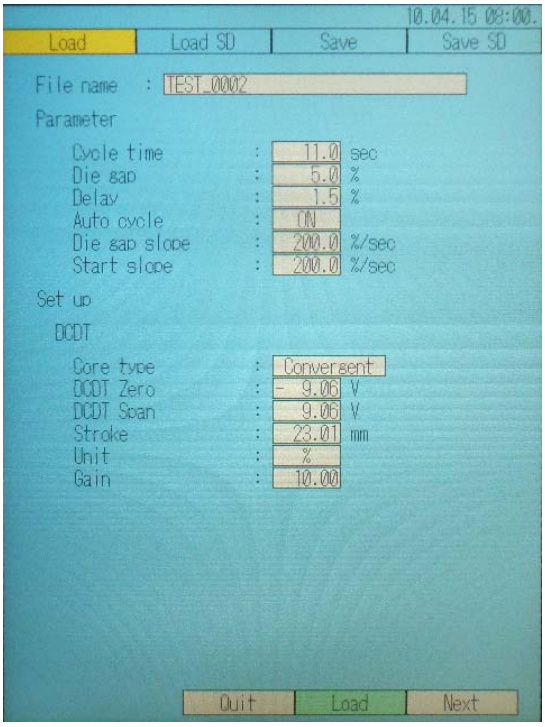


Figure 2-25 Load a File?

2-4-5. F4: Monitor Mode

Mode obtained by pressing the **F4** key.

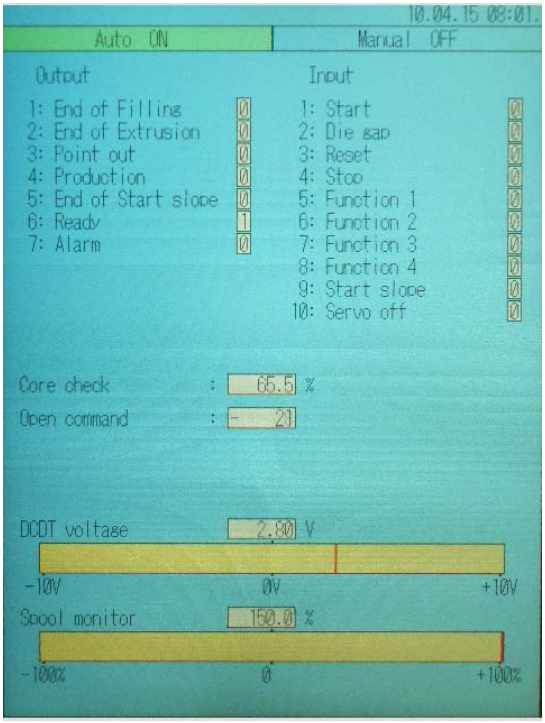


Figure 2-26 F4: Monitor Mode Screen

Display

Available at all times. But not available to change manual mode when manufacturing containers

Manual Mode is used to display and/or control the positions of the tooling actuator (DCDT) and the value of the servovalve input current as well as the Output ON/OFF functions. Auto Mode ONLY displays the above information.

Commands

The **Cursor** is used to move to the various commands only in MANUAL mode. The Set Key is inactive. The displayed values reflect the actual positions or servovalve current. (or Spool position in EFB mode)

Output

There are 7 output commands which may be changed with the **Entry Knob**. Counter-clockwise rotation produces a 0 (OFF) and Clockwise rotation a 1 (ON).

The functions controlled are: (1) End of Filling; (2) End of Extrusion; (3) Point out; (4) Production; (5) End of Start slope; (6) Ready; (7) Alarm.

Input

There are 10 input commands to monitoring the following functions: (1) Start, (2) Die gap; (3) Reset; (4) Stop; (5) Function 1; (6) Function 2; (7) Function 3; (8) Function 4, (9) Start Slope, (10) Servo off.

Core check

When the display **Cursor** points to "**Core check**", it is possible to control the tooling position in closed loop using the **Entry Knob** between 0 to over 3276.7%. (100% = Span position)

Open command

When the display Cursor points to "**Open command**", it is possible to control the value of the servovalve input current with the Entry Knob.

USE OF "Open command" MAY RESULT IN DAMAGE TO THE TOOLING.

When the servovalve input is equal to any value other than those in the Zero range, servovalve oil flow will cause the tooling cylinder to move. The tooling actuator will stop only when the servovalve input current is within a very narrow band in the Zero current range. If the tooling actuator stops due to contact with the die and mandrel, very high forces may be exerted on the tooling, possibly causing damage. It is highly recommended that the hydraulic pressure be reduced to a low value to prevent possible damage.

To prevent inadvertent damage, setting the Open command to "Disable" in Machine setup display (F4+Set) will disable this function.

2-4-6. F5: Data Display Mode

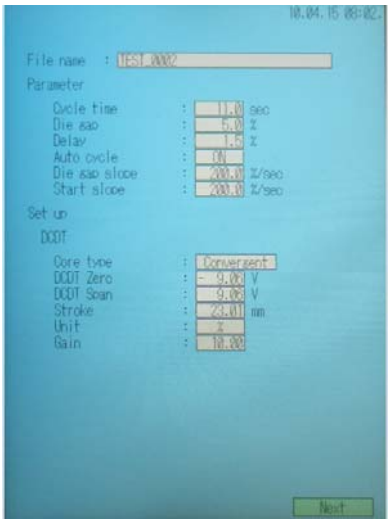


Figure 2-27 Data Display Screen A

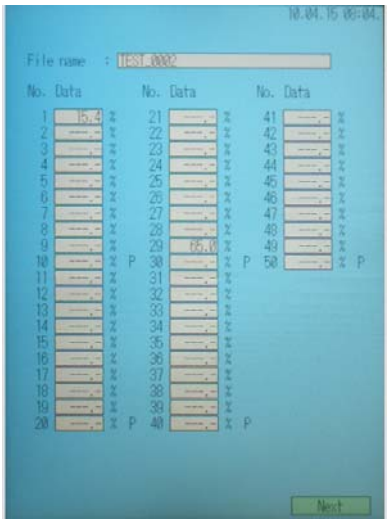


Figure 2-28 Data Display Screen B

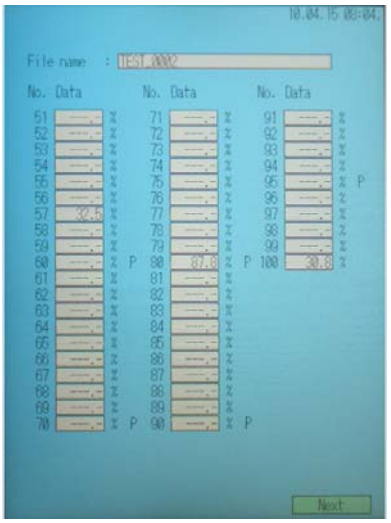


Figure 2-29 Data Display Screen C

Mode is displayed by pushing the **F5** Key

Display

Available when manufacturing containers.

Function

To display the conditions, parameters and profile data for the container currently being made. Press set to see next page one by one.

2-4-7. F1+Set: Set Up Mode

Mode is displayed by pushing the **F1+SET**

Display

Not available when manufacturing containers

Function

Set Up is used to set up the conditions and parameters required for proper operation when the container and/or die gap tooling are changed.

Commands

Set Up Mode is covered in detail in the DigiPack Ⅱ Installation manual, 1-7. TOOLING SYSTEM SETUP

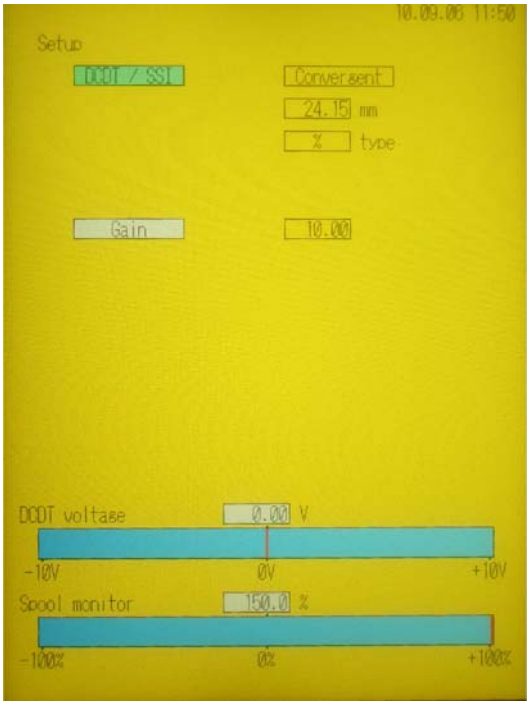


Figure 2-30 F1 + SET: Setup Screen

2-4-8. F2+Set Analog monitor

Mode is obtained by pressing **F2+Set.**

Display

Not Available while manufacturing containers

Function

Internal signal assign to analog monitor channels 1 to 4. (TB1, 11, 12, 28 and 29)

Commands

Change the displayed parameter using the Set Key, revise the value with the **Entry Knob** and confirm with the **Set** Key.

Signal

The following signals able to set to "**Signal**", then each channels are monitored on Monitor channel on TB1.

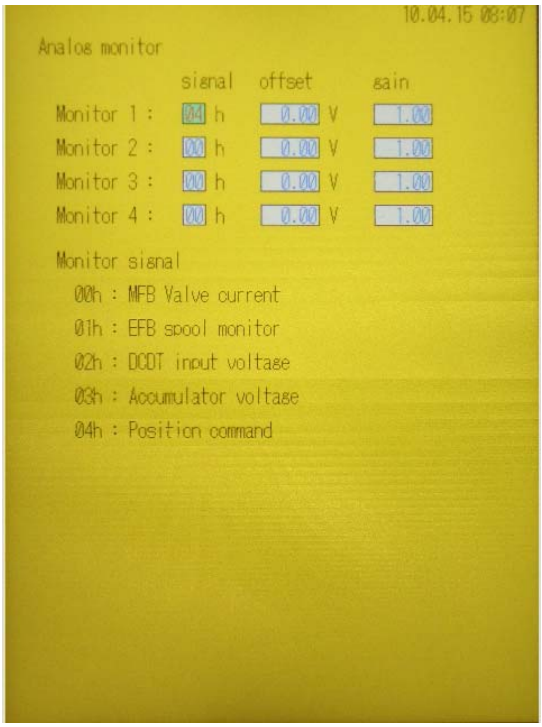


Figure 2-31 F2 + SET: Analog Monitor Screen

00h : MFB valve current -> Monitored MFB Servovalve Current (Set at F4+Set) with +-10V.
01h : EFB spool monitor -> Monitored Spool position (4-20mA) with +-10V if EFB mode.
02h : DCDT input voltage -> Monitored DCDT Position (0-100%) with 0-10V.
03h : Accumulator voltage -> Monitored Accumulator Position (0-100%) with 0-10V.
04h : Position command -> Monitored Parison command signal with 0-10V.

Offset

Add this value to output signal of monitor channel.

Gain

Set gain function for output signal. Ex) if Gain=2.00 then 50% is 10V output.

2-4-9. F3+Set File delete and Backup/Restore

Mode is obtained by pressing **F3+Set.**

Display

Not Available while manufacturing containers

Function

Data file delete and all data backup to SD card and Restore from SD card

Commands

Select the required function "**Delete**", "**Backup**" or "**Re-store**" using the **Entry Knob** and confirm with the **Set** Key.

Figure 2-32 F3 + SET: File delete and Backup

Delete

Delete the existing file which saved in Flash RAM. (F3: File mode). If press **Set** at **Delete**, Display indicate as *Figure 2-33*. And select file name using **Entry Knob** and press **Set.** Then will be delete the selected file.

Backup

If press **Set** at **Backup**, all Flash RAM data in DigiPack Ⅱ is copied in to SD card.
* This function backup **Profile** data only, dose not managed **Wave** data.

Restore

If press **Set** at **Restore**, all backup file in SD card restore to Flash RAM of DigiPack Ⅱ.
* This function Restored **Profile** data only, dose not managed **Wave** data.

When execute the Restore, all Flash RAM data in DigiPack Ⅱ are erased and write again data from SD card. If the save data in Flash RAM is deferent from SD card, all data in Flash RAM will lost.
And When the Backup or Restore executed, SD card needs to insert SD card slot. If SD card is not in slot, below message occurred and can not continue Backup/Restore.
"**SD card is not insert to slot or format is not correct**"

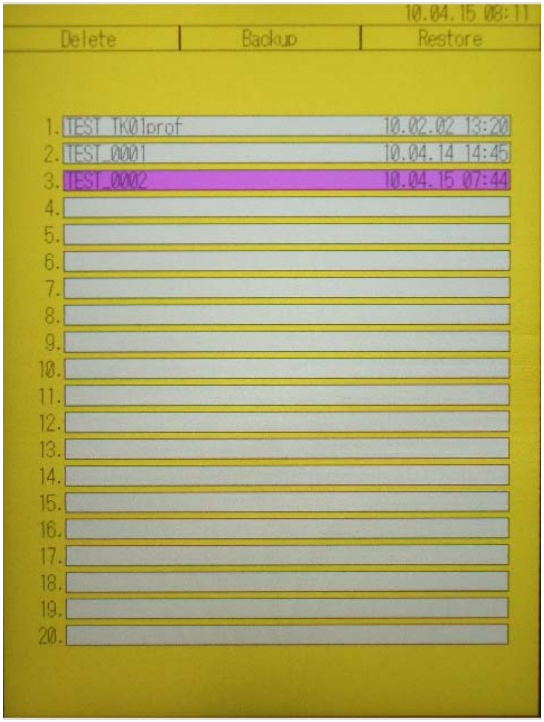


Figure 2-33 File delete

2-4-10. F4+Set: Machine Setup

Mode is displayed by pushing the **F4+SET**

Display

Not available when manufacturing containers

Function

Machine setup is used to set up the conditions and parameters required for proper operation when install the most beginning to machine or change machine mode.

Commands

Machine setup is covered in detail in the DigiPack Ⅱ Installation manual, 1-7. TOOLING SYSTEM SETUP

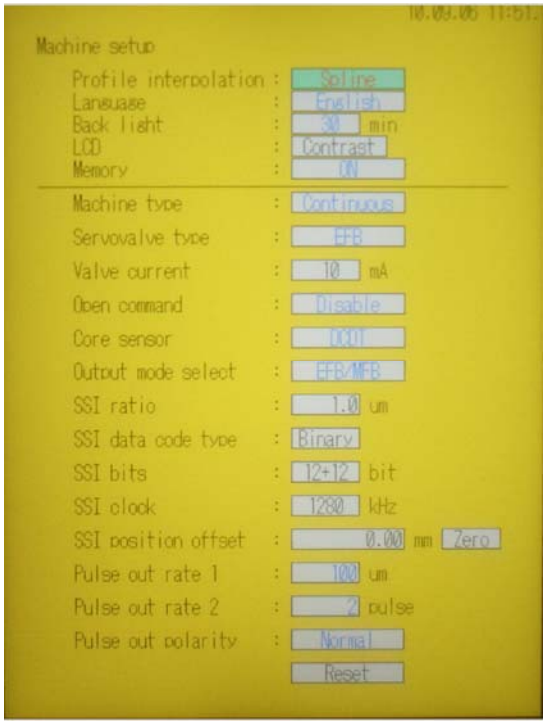


Figure 2-34 F4 + SET: Machine Setup Screen

2-4-11. F5+Set: Communication Mode

Mode is obtained by pressing **F5+SET**.

Display

Not available when manufacturing containers.

Function

Provides RS422 and Ethernet communication with a host computer, using the parameters shown on the LCD display. And also can be set internal clock in this display.

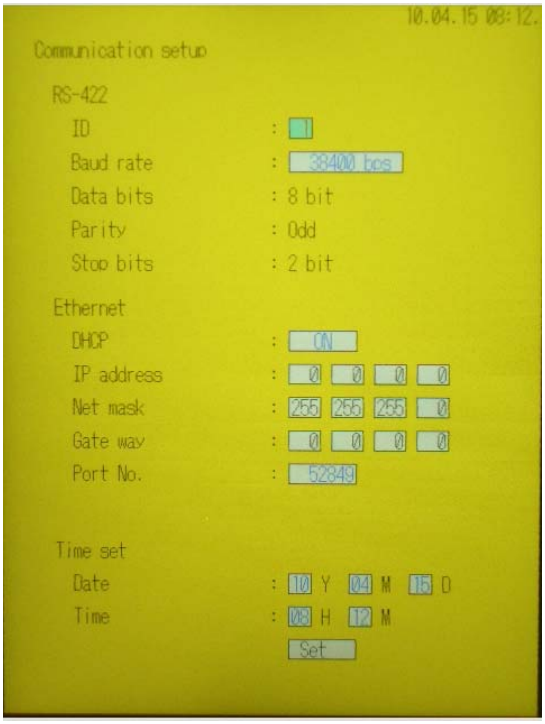


Figure 2-35 F5 + SET: Communication Mode Screen

RS422 Communication Setup

ID	1 – 32
Baud Rate	9600 or 19200 or 38400 or 115200 or 230400 or 460800 bps
Character Length	8 bits (Fixed)
Parity Check	Odd (Fixed)
Stop Bit	2 bits (Fixed)

Ethernet Communication Setup

DHCP	ON or OFF
IP address	If DHCP is ON, automatically set this parameter.
Net mask	If DHCP is ON, automatically set this parameter.
Gate way	If DHCP is ON, automatically set this parameter.
Port No.	0 – 65535

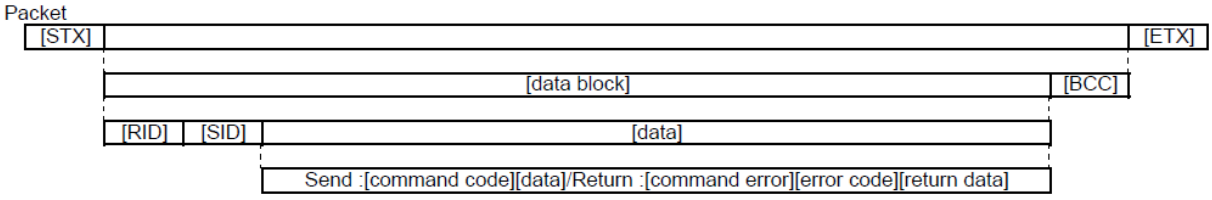
Time Set

Change the displayed parameter using set key, revise the value with the **Entry Knob** and confirm with the **Set** key.
One cycle of this timer is 24 hours.

2-5. COMMUNICATION PROTOCOL

2-5-1. RS422 COMMUNICATION SPECIFICATION

Type	RS-422
Communication character	ASCII code 20h～7Fh (Capital letter and control code)
	[STX](02h)、[ETX](03h)
	numerical data is 2 and 4 ,8 characters of hexadecimal number
	Capital letter (A,B,C,D,E,F)
Baud rate	9,600[bps]、19,200[bps]、38,400[bps]、115,200[bps]、230,400[bps]、460,800[bps]
Parity check	Odd (fixed)
Data length (character length)	8[bit] (fixed)
Stop bits	2[bit] (fixed)
Maximum packet length	Data：1024[Byte] + control：8[Byte]



[STX] … ASCII code "02h" 1byte. Start of text.

[ETX] … ASCII code "03h" 1byte. End of text.

[BCC] … Sum total that counted [data block] and the hexadecimal number in 8 bits subordinate position (2 bytes) is added as a character string.
Anything doesn't respond if BCC is not correct. *** When BCC is made into "＊＊", don't check BCC data.**

[RID]/[SID] … [RID]:DigiPack2 ID, [SID]:PC ID. (hexa 2 bytes)
[RID] If ID is not corresponding, any DigiPack2 doesn't respond.

[Command code] … 2 bytes character string.

2-5-2. PROFILE

Please refer to the 2-6. profile data list.

2.5.2.1. WRITE PROFILE DATA (ALL PROFILE POINT)

	0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	…	…	…	…	396	397	398	399	400	401	402	403
PC→DigiPack2	P	0	file No		Profile point 1				Profile point 2				Profile point 3				…				Profile point 99				Profile point 100			

	0	1	2	3
DigiPack2→PC	P	0	Error	

file No 0= F1 screen profile data nothing profile set data :"FFFF"
file No 1～100= F3 file (internal profile data)

2.5.2.2. READ PROFILE DATA (ALL PROFILE POINT)

	0	1	2	3
PC→DigiPack2	P	1	file No	

nothing profile set data :"FFFF"

	0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	…	…	…	…	396	397	398	399	400	401	402	403
DigiPack2→PC	P	1	Error		Profile point 1				Profile point 2				Profile point 3				…				Profile point 99				Profile point 100			

2.5.2.3. WRITE PROFILE DATA (EACH DATA OR BLOCK DATA)

PC→DigiPack2

0	1	2	3	4	5	6	7	8	9	10	11	12	13
P	2	file No		P-addr		Data				…			

P-addr : please refer to the profile data list.

DigiPack2→PC

0	1	2	3
P	2	Error	

2.5.2.4. READ PROFILE DATA (EACH DATA OR BLOCK DATA)

PC→DigiPack2

0	1	2	3	4	5	6	7
P	3	file No		P-addr		n	

it can be with out to "n".

DigiPack2→PC

0	1	2	3	4	5	6	7	8	9	10	11
P	3	Error		Data				…			

2.5.2.5. WRITE ALL PROFILE DATA (INCLUDE PARAMETER)

PC→DigiPack2

0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	…	35
P	4	file No		File name															

36	37	38	39	40	41	42	43	44	45	46	47	48	49	50	51	52
y	y	/	m	m	/	d	d		h	h	:	m	m	:	s	s

53	54	55	56	…	…	…	…	449	450	451	452	453	454	455	456	…	…	…	…	489	490	491	492
Profile point 1				Profile point xx				Profile point 100				Marker point 1				Marker point x				Marker point 10			
493	494	495	496	497	498	499	500	501	502	503	504	505	506	507	508	509	510	511	512	513	514	515	516
Shot size				Die gap				Delay				Cushion				Die gap slope				Start slope			
517	518	519	520	521	522	523	524	525	526	527	528	529	530	531	532	533	534	535	536	537	538	539	540
Spline				Core stroke				Accum. stroke				DCDT Zero				DCDT Span				Accum. Empty			
541	542	543	544	545	546	547	548	549	550	551	552												
Accum. Full				Type set				Gain															

character length is 32 text
"SPACE" is written at the blank.

nothing profile set data :"FFFF"

DigiPack2→PC

0	1	2	3
P	4	Error	

2.5.2.6. READ ALL PROFILE DATA (INCLUDE PARAMETER)

PC→DigiPack2

0	1	2	3
P	5	file No	

DigiPack2→PC

0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	…	35
P	5	file No		File name															

36	37	38	39	40	41	42	43	44	45	46	47	48	49	50	51	52
y	y	/	m	m	/	d	d		h	h	:	m	m	:	s	s

53	54	55	56	…	…	…	…	449	450	451	452	453	454	455	456	…	…	…	…	489	490	491	492
Profile point 1				Profile point xx				Profile point 100				Marker point 1				Marker point x				Marker point 10			
493	494	495	496	497	498	499	500	501	502	503	504	505	506	507	508	509	510	511	512	513	514	515	516
Shot size				Die gap				Delay				Cushion				Die gap slope				Start slope			
517	518	519	520	521	522	523	524	525	526	527	528	529	530	531	532	533	534	535	536	537	538	539	540
Spline				Core stroke				Accum. stroke				DCDT Zero				DCDT Span				Accum. Empty			
541	542	543	544	545	546	547	548	549	550	551	552												
Accum. Full				Type set				Gain															

character length is 32 text
"SPACE" is written at the blank.

nothing profile set data :"FFFF"

2.5.2.7. WRITE FILE NAME

PC→DigiPack2

0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	…	35
P	6	file No		File name															

maximum file name is 32 characters
space is "SPACE" SPACE=20h

DigiPack2→PC

0	1	2	3
P	6	Error	

2.5.2.8. READ FILE NAME

PC→DigiPack2

0	1	2	3
P	7	file No	

DigiPack2→PC

0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	…	35
P	7	Error		File name															

maximum file name is 32 characters
space is "SPACE"

2.5.2.9. WRITE TIME

	0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20
PC→DigiPack2	P	8	file No		y	y	/	m	m	/	d	d		h	h	:	m	m	:	s	s

file No 0= internal clock
date is character string of decimal

	0	1	2	3
DigiPack2→PC	P	8	Error	

2.5.2.10. READ TIME

	0	1	2	3
PC→DigiPack2	P	9	file No	

	0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20
DigiPack2→PC	P	9	Error		y	y	/	m	m	/	d	d		h	h	:	m	m	:	s	s

file No 0= internal clock
date is character string of decimal

2-5-3. WAVE

2.5.3.1. READ WAVE. WAVE MEMORY OF REAL OPERATION

	0	1	2	3	4	5	6	7
PC→DigiPack2	T	0	Address				n	

Address : 0~495
"n" : max 255
it can be with out to "n".

	0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
DigiPack2→PC	T	0	Error		Data1				Data2				...			

2-5-4. MONITOR

2.5.4.1. A/D CONVERT CHANNEL

	0	1	2	3	4	5
PC→DigiPack2	M	0	ch		n	

"ch" is channel number of ADC
it can be with out to "n".

	0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
DigiPack2→PC	M	0	Error		Data1				Data2				...			

2.5.4.2. D/A CONVERT CHANNEL

	0	1	2	3	4	5
PC→DigiPack2	M	1	ch		n	

"ch" is channel number of DAC
it can be with out to "n".

	0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
DigiPack2→PC	M	1	Error		Data1				Data2				...			

2.5.4.3. DIGITAL INPUT

	0	1	2	3	4	5
PC→DigiPack2	M	2	0	0	n	

it can be with out to "n".

	0	1	2	3	4	5	6	7
DigiPack2→PC	M	2	Error		Data1			

2.5.4.4. DIGITAL OUTPUT

PC→DigiPack2

0	1	2	3	4	5
M	3	0	0	n	

it can be with out to "n".

DigiPack2→PC

0	1	2	3	4	5	6	7
M	3	Error		Data1			

2-5-5. INFORMATION DATA

2.5.5.1. DEVICE NAME

PC→DigiPack2

0	1	2	3
L	S	0	0

DigiPack2→PC

0	1	2	3	4	5	6	7	8	9	10	11	12	13	14
L	S	Error		D	I	G	I		P	A	C	K		2

variable character length data

2.5.5.2. SERIAL NUMBER

PC→DigiPack2

0	1	2	3
L	S	0	1

DigiPack2→PC

0	1	2	3	4	5	6
L	S	Error		1	2	3

variable character length data

2.5.5.3. PRODUCTION DATA

PC→DigiPack2

0	1	2	3
L	S	0	2

DigiPack2→PC

0	1	2	3	4	5	6	7	8	9	10	11
L	S	Error		2	0	1	0	/	4	/	1

variable character length data

2.5.5.4. HARDWARE VERSION

PC→DigiPack2

0	1	2	3
L	S	0	3

DigiPack2→PC

0	1	2	3	4	5	6	7
L	S	Error		V	1	.	0

variable character length data

2.5.5.5. SOFTWARE VERSION

PC→DigiPack2

0	1	2	3
L	S	0	4

DigiPack2→PC

0	1	2	3	4	5	6	7
L	S	Error		V	1	.	0

variable character length data

2.5.5.6. MAC ADDRESS

PC→DigiPack2

0	1	2	3
L	S	1	0

DigiPack2→PC

0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20
L	S	Error		0	0	:	0	9	:	C	C	:	1	0	:	x	x	:	x	x

character data

2-5-6. OTHER

2.5.6.1. BCC CHECK INVALID

PC→DigiPack2

0	1	2	3	4	5
Z	Z	2	2	0	0

DigiPack2→PC

0	1	2	3
Z	Z	Error	

2.5.6.2. BCC CHECK VALID

PC→DigiPack2

0	1	2	3	4	5
Z	Z	2	2	0	1

DigiPack2→PC

0	1	2	3
Z	Z	Error	

* The BCC check of RSS422 communication is automatically validated after a power supply ON
* Even when the BCC code is invalid, 2 bytes of the BCC code are required (transmitted "00").
* Even when the BCC code is validated, a BCC check will be passed if 2 bytes of the BCC code are made into "**"

When 2 bytes of the BCC code are made into "**", communication will be performed even when data is incongruent. The operation in that case is not guaranteed. Please perform transmission and reception of data after sufficient cautions.

2.5.6.3. RESET COMMAND

PC→DigiPack2

0	1	2	3
R	S	0	0

DigiPack2→PC

0	1	2	3
R	S	Error	

2.5.6.4. SET RTC

PC→DigiPack2

0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18
R	T	y	y	/	m	m	/	d	d		h	h	:	m	m	:	s	s

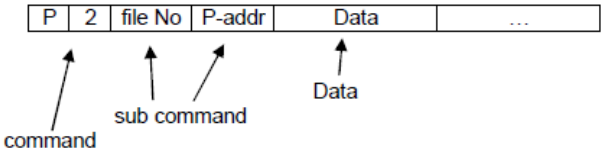
DigiPack2→PC

0	1	2	3
P	T	Error	

2-5-7. ERROR CODE

2.5.7.1. ERROR CODE

00	No error	No error
01	Command code error	The corresponding command code doesn't exist.
02	Command length error	Command and format are the disagreements.
03	Numeric area error	command or data are not correct character strings.
04	Sub command error	sub command is out of spec
05	Data format error	data value is out of range.
06	no file error	It accessed an unregistered file.
10	Flash memory error	



DigiPack Ⅱ Manual, User

2-6. PROFILE DATA LIST

Prpfile Data address and data form

	address	name	range	screen	content
1		File no	1～100	F3	"0" is F1 screen profile data
2		File name		F1,F2,F3,F5	max 32 characters
3		Date		F3	yy/mm/dd hh:mm:ss 17 characters
4	00	Shot size/Cycle time	1 ～ 9999	F1	Shot size[0.1%]/Cycle time[0.1sec]
5	01	Die gap	0 ～ 1000	F1	[0.1%]
6	02	Delay	0 ～ 9999	F1	[0.1%]
7	03	Cushion	0 ～ 9999	F1	[0.1%]
8	04	Die gap slope	1 ～ 9999	F2	[0.1%/sec]
9	05	Start slope	1 ～ 9999	F2	[0.1%/sec]
10	06	Spline	0=invalid 1=valid	F4+set	
11	07	Core stroke	1 ～ 9999	F1+set	unit 0.01mm Tooling length
12	08	Accum. stroke	1 ～ 9999	F1+set	unit 0.1mm
13	09	DCDT zero	−1000 ～ 1000	F1+set	set voltage : unit [0.01V]
14	0A	DCDT span	−1000 ～ 1000	F1+set	set voltage : unit [0.01V]
15	0B	Accum. Empty	0 ～ 1000	F1+set	set voltage : unit [0.01V]
16	0C	Accum. Full	0 ～ 1000	F1+set	set voltage : unit [0.01V]
17	0D	Type set	bit0: 0 = Divergent, 1= Convergent (Core type) bit1: 0 = %, 1 = mm (Core stroke unit) bit2: 0 = %, 1 = mm (Accumu−lator stroke unit) bit3: 0 = Extrusion fixed, 1 = Filling fixed (Accumulator type only) bit4: 0 = OFF, 1 = ON (Auto cycle)	F1+set	
18	0E	Gain	1～32767	F1+set	[0.01]
19	70	Marker point 1	0～100	F2	Profile point 1～100 ("0" is not output)
20	71	Marker point 2	0～100	F2	
21	72	Marker point 3	0～100	F2	

22	73	Marker point 4	0～100	F2	
23	74	Marker point 5	0～100	F2	
24	75	Marker point 6	0～100	F2	
25	76	Marker point 7	0～100	F2	
26	77	Marker point 8	0～100	F2	
27	78	Marker point 9	0～100	F2	
28	79	Marker point 10	0～100	F2	
29	80	Profile point 1	−1 ～ 1000	F1	[0.1%]
30	81	Profile point 2	−1 ～ 1000	F1	[0.1%]
≀	≀	≀	≀	≀	≀
128	E3	Profile point 100	−1 ～ 1000	F1	[0.1%]

2-7. SETTING UP

2-7-1. OBJECTIVE

The container produced by the blow molding process must meet the customer's specification. Customer's specifications normally involve standards for appearance, weight and physical characteristics such as strength, endurance and dimensional accuracy.

The container design process will determine the material to be used, the shape of the mold and required special features as well as the size and shape of the die gap tooling.

The task of the set up man is to use the above information with the DigiPack Ⅱ to control the parison wall thickness and placement in the mold to produce the container to its design specification.

The setup man must become familiar with the contents and definitions contained in Section 1-3 and 1-4.

2-7-2. DIE GAP TOOLING SETUP

A feature of the DigiPack Ⅱ is its ability to store the programmed parison wall thickness profile and other settings required to produce a particular container. Up to 100 container files may be stored. The stored container files in the DigiPack Ⅱ easily allow the change from one container to another.

The stored information for a particular container contains the closed tooling die gap position and the relationship between the programmed wall thickness or die gap opening and the actual tooling die gap opening produced by the desired wall thickness. In other words, the relationship between the programmed die gap opening and the actual die gap opening has been calibrated. For example, a commanded die gap opening of 37% could be calibrated to cause an actual die gap opening of 6.7mm. The tooling die gap calibration information is contained in the container file.

In order to quickly change the blow molding machine production from one container to another with minimum change over time, the tooling die gap calibration must be accurately established.

The DigiPack Ⅱ Installation and Maintenance Manual contains a tooling die gap calibration procedure in Section 1-6, DIE GAP TOOLING SETUP. To achieve the minimum change over time it is essential that this procedure be followed and the requested information recorded.

2-7-3. PRELIMINARY SET UP

SHOT SIZE

Shot Size basically determines the amount of plastic to be extruded through the die gap to make the container. In an accumulator machine it is the extrusion stroke of the accumulator, in a continuous machine it is determined by the time required to extrude the plastic volume or weight required by the container and tail, and also by the cooling capacity of the mold. This time or stroke was probably determined when the particular blow molding machine was selected to produce the container.

DIE GAP

Die Gap will probably be set to 0% for an accumulator machine to eliminate drool. In a continuous extrusion machine, the Die Gap must be used to set a minimum die gap opening (may also have mechanically set minimum opening) to prevent damage to the extruder and/or tooling due to excessive pressure or to a larger opening consistent with the parison tail requirements at the top of the container.

DELAY

Delay will initially be determined by the required tail length at the bottom of the container. Delay would be equal to the tail length divided by the length of the mold.

AUTO SHOT

Auto Shot does not apply to accumulator machines,.
Auto Shot would be ON if the DigiPack Ⅱ is only controlling the parison wall thickness and its cycle time is determined only by the interval between the machine controlled knife cuts.
Auto Shot would be OFF if the machine timing is partially or totally controlled by the DigiPack Ⅱ. For example, if the mold closure timing is controlled by a DigiPack Ⅱ marker pulse, then the time from the knife cut to mold closure is set by the DigiPack Ⅱ's Shot Size; the time from the marker pulse to the knife cut is controlled by the machine's controller.

WEIGHT, RANGE H and RANGE L

Weight, Range H and Range L are set by default to zero at the beginning of setup.

DIE GAP OPENING

Die Gap Opening is determined by the Die Gap Opening required to extrude the required parison weight for the container and is part of the initial selection of extruder speed and the specific tooling used. This average opening is set at program point 1 and program point 100 and the resulting die gap program will be a constant die gap opening between points 1 and 100.

2-7-4. INITIAL TRIALS

After the heater bands have brought the extruder barrel and extrusion head to the desired temperature, some trial containers are blown. The blow molding machine timing and motions are adjusted to obtain a sealed container. Adjustments to the constant die gap program, **Shot Size, Die Gap** and **Delay** may have to be made before a sealed container is obtained. At this time, the die gap tooling opening is fixed and the operator would follow the same logic he would use if the tooling was mechanically fixed in position to obtain a sealed container.

Once a sealed container is obtained, it should be sliced open along the axis parallel to the parison length. If the containers plastic material is translucent, then thick and thin areas can be found by visual observation In any case, container wall thickness measurements should be made along the cut edge and compared with the target wall thickness. The wall thickness or die gap opening program is then changed based upon the differences with the target thickness.

More containers are then blown, cut open and the die gap opening changed as required. After two or three trials it would be helpful to know the location of the programmed portion of the parison in the mold.

One method is to reduce the programmed thickness at one point and determine where that reduced wall thickness ring is located in the container wall. Often, the reduced thickness point can be clearly seen. Further trials with a single reduced thickness point at different locations along the container will help to determine the position of the programmed points along the length of the actual container.

Do not run tests with more than one reduced thickness point. Reducing the wall thickness at a point will change the distribution of plastic along the parison length and the use of more than one reduced thickness point will lead to improper assessment of the results.

A second method to determine the program point distribution on the container is to mark the parison wall at or as near as possible to the place where the parison leaves the die gap tooling. The marks may be applied manually or it may be possible to use marker pulses to operate an ink jet. This method marks the program points on the parison without distorting the parison or container.

When program points 1 and 100 are marked, the position of the programmed portion of the parison in the mold may be determined and adjusted.

A constant thickness container wall will be probably obtained before the correct weight. Adjustment of Weight, Range H or Range L will then allow both the correct container weight and wall thickness to be obtained with minimum requirement for the operator to change the value of any individual programmed die gap opening points.

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