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4.1 Modes of operation

In the following the various modes of operation are explained. The solenoid valves are additionally equipped with emergency manual-operation facility; when the motor is running each individual motion can be emergency-controlled (if the pushbutton on the control console fails).

Caution: When operating with this emergency control all interlocks are put out of action. If the injection solenoid valves 6, 7 are operated, injection takes place even with the die open. It is thus only permitted to use the emergency-control facility with the injection plunger removed and this facility may only be operated by the responsible machine setter.

4.1.1 Manual operation

The position "Manual" is selected at the switch on the switch panel. All functions can now be operated manually. Should it be required to run through a complete machine cycle, the hood must be closed and the locking parts together. The electrical interlocks are also effective during manual operation, so that the sequence of operation is fixed by the choice of program.

4.1.2 Single cycle (semi-automatic)

The switch on the switch panel is set to "Automatic". Bring the machine to the starting position by operating the pushbutton "starting position". The indicator lamp switches off on reaching the starting position. Now the start button can be operated. The machine performs the pre-selected machine cycle. On completion of the cycle the machine stops. In order to initiate a further cycle the start button must again be operated.

4.1.3 Continuous cycle (fully automatic)

Switch position is as for semi-automatic. In addition the "continuous cycle" selection switch is pressed. Upon operating the start button the machine will now run in continuously repeating cycles. The following cycle is initiated - according to the program selected - by termination of the opening time or by a signal from the weighing equipment upon completion of the weighing operation, when the complete part is lying in the scales, or after a signal from other ancillary equipment.

4.1.4 Operation for machine setting

The accident prevention regulations permit putting the protection devices (protective hood) out of action if, in addition, a key switch is used. This is achieved by switching the key switch on the switch panel to "setting".

It is now possible, independent of the guard, to initiate the individual motions using the switches on the switch panel. For casting, the protective cover must be advanced, after which casting can be carried out as often as required, however only up to the 1st phase.

The setting switch key can only be withdrawn when the setting operation is switched off.

Caution: It is only permitted to hand the key over to the responsible machine setter. It is not permissible for the operating personnel to have any possibility of switching out the protection devices.

4.2 Machine program

The individual basic programs are explained below. The preselection of programs is made by pressing the preselection switch at the control cabinet. For programs with ancillary devices (core pullers, ejector) the connection plug of the particular device must be plugged, in place of the blanking plug.

4.2.1 Program I

Without ejector, without movable core puller, without fixed core puller.

4.2.2 Program II

With ejector, without movable core puller, without fixed core puller, preselection switch "ejector" pressed. Ejector plug plugged in.

4.2.3 Program III

Without ejector, with movable core puller, without fixed core puller. Preselection switch "movable core puller" pressed. Connection plug of the movable core puller plugged in. Should the preselection "movable core puller" be cancelled while the core puller is in the advanced position, the machine operates without Program III, but with the core puller advanced. Should the connection plug be plugged in and the function is not preselected, or, if the program is preselected and the plugs have not been plugged in, the machine does not operate.

4.2.4 Program IV

Without ejector, without movable core puller, with fixed core puller. Preselection switch "fixed core puller" pressed. Connection plug of the fixed core puller plugged in. Should the core puller plug be plugged in and the function not preselected, the core puller advances, but the machine control does not receive the signal "Fixed core puller advanced". The machine does not start operating. Starting of the machine is also blocked if the function is preselected and the plug has not been plugged in.

4.2.5 Program V

With ejector, with movable core puller, without fixed core puller. Appropriate preselection switch pressed. Connection plugs for ejector and core puller plugged in. Conditions as for Programs II and III.

4.2.6 Program VI

With ejector, without movable core puller, with fixed core puller.

Appropriate preselection switches pressed and connection plug plugged in.

Conditions as for Programs II and IV.

4.2.7 Program VII

With ejector, with movable core puller, with fixed core puller.

Appropriate preselection switches pressed and connection plugs plugged in.

Conditions as for Programs II, III and IV.

4.2.8 Program VIII

Core Puller Program III

For the movable and fixed die platen an additional core puller can be positioned by means of the Core Puller Program III.

The sequence is in the order Plug I and II, that is, the core puller of Plug I advances first of all.

When this reaches its end position the 2nd core puller of Plug II advances.

The retraction is in the order first II and then I.

Caution: If operation is with only one core puller (Core Puller Program I and II), these must always be plugged into Socket I (fixed or movable).

4.3 Extension programs (selection switch)

The basic programs can be extended by the following additional programs. This is done by pressing the particular preselection switch at the control cabinet and by plugging in the connection plug.

4.3.1 Ejector repetition circuit

Ejector repetition is limited during automatic operation by the ejector time, that is, the ejector motion is repeated until the ejector time is elapsed.

4.3.2 Hood

When the selection switch "hood" is pressed, the hood opens and closes during automatic operation for each machine cycle.

4.3.3 Spraying without counter

Should the selection switch "Spraying without counter" be operated, the spraying device advances between the die parts at every cycle, the spraying operation, however, continues to be controlled by the counter.

4.3.4 Spraying with ejector

With the selection switch "Spraying with ejector" pressed the spraying device positions itself simultaneously with the advancing ejector.

4.3.5 Spraying after ejector

With the selection switch "Spraying after ejector" pressed the spraying device positions itself after the ejector was in the advanced position, or after the ejector time has elapsed.

4.4 Time-regulated programs

The time-regulated programs are regulated by means of timing clocks. The clocks are mounted on the instrument panel of the control cabinet.

4.4.1 Dwell time

For setting the period during which the injection force continues to act on the cast metal in the die.

4.4.2 Cool-down time

For setting the time during which the cast metal in the die can cool down.

4.4.3 Opening time

For automatic operation, for regulating the time interval between machine cycles.

4.4.5 Ejector time

During automatic operation, for setting the time during which the ejector remains in the advanced position, or the time in which the ejector travels between the positions "advanced" and "retracted" when ejector repetition is set.

4.4.5 Blow-out and spray air time

See the appended operating instructions for the blow-out and spray air device (Section 9).

4.4.6 Lubrication time of injection plunger

During automatic operation, for setting the lubrication shot time of the injection plunger.

4.5 Indicator lamps

The indicator lamps on the switch panel have the following functions:

- Hydraulics: - Lamp lights up as soon as the hydraulic system is pressurized.
- Automatic: - Lamp lights up when automatic operation is switched on.
- Starting position: - During operation the lamp lights up and extinguishes on attainment of the starting position.
- Hydr. tank heating: - Lamp lights up during warm-up and extinguishes on reaching the minimum operating temperature. During the warm-up phase the hydraulic drive is blocked.
- Pressure filter clogged: - Lamp lights up as soon as clogging in the high-pressure filter becomes critical. The filter insert must be cleaned as soon as possible (see Section 2).
- Suction filter clogged: - Lamp lights up as soon as clogging in the suction filter at the hydraulic pump inlet becomes critical. The hydraulic drive is then switched off.