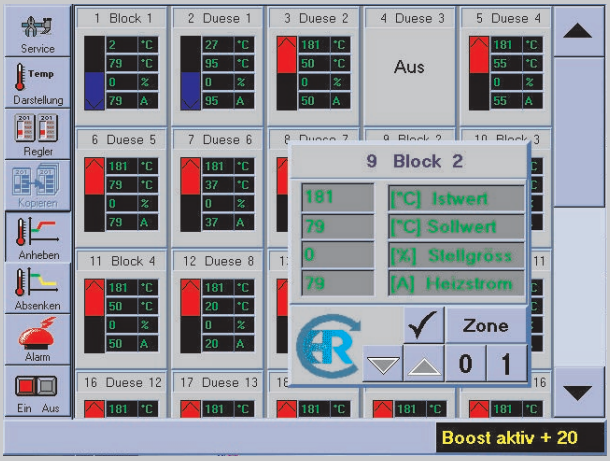

Hot-runner control system HRC 800

Multi-channel system for up to 160 temperature control loops

System is based on the multi-channel controller KS 800

Clear and confident operation via touch-screen feature and TFT colour display

Trend indication with long-term data storage, e.g. for quality reporting

Error messages in plain text ensure fast trouble shooting

intelligent program for mould diagnostics

PROFILE

The hot-runner control system **HRC 800** is based on the successful **KS 800** temperature controller, and features simple touch-screen operation with TFT colour display.

The 8-channel KS 800 controllers enable stand-alone systems to be designed with more than 160 control loops without sacrifices in control precision or reliability.

The operating system consists of an industrial PC that is linked to the **KS 800** controllers via a CANbus, thus allowing it to be located wherever convenient.

Operation has been tailored to the demands of the operator and is similar to the operating procedures for **PMA's** single-loop controller **KS 50** and the hot-runner control system **HRC KS.**

Just one glance is enough to see if everything is within limits. Colour changes are used to highlight any deviations or faults. Just one touch of the screen is enough to operate the selected control loop manually. A "copy" function allows the simultaneous configuration of several control loops. Trend displays show the control behaviour and enable process records to be made.

In case of operating errors or disturbances, error messages in plain text ensure fast and confident remedial action.

Special features such as start-up function, controlled heating up, set-point raising (boost), set-point lowering (standby), output "hold" on sensor break, self-tuning, and intelligent mold diagnosis make the **HRC 800** ideally suited for temperature control of hot-runner molds.

Clear operation and dedicated functions guarantee a longer life of the heating elements, prevent production down- times, and ensure fast commissioning plus short start-up times.

DESCRIPTION

Construction of the HRC 800 system

The HRC 800 system is mounted in a rugged, mobile cabinet with a built-in or tabletop industrial PC and a monitor that is suitable for touch-screen operation. The control cabinet is completely wired to standard heavy-duty connectors.

START-UP CIRCUIT

High-performance heating elements with magnesium oxide insulation must be heated slowly, to remove any humidity and to prevent destruction. With activated start-up circuit, the controller uses the adjusted start-up temperature (e.g. 40%) until reaching the starting set-point (e.g. 95°C). Start-up gradient and starting temperature can be selected individually for nozzles and blocks.
The starting set-point, e.g. 95°C, is maintained during the selected start-up dwell time, e.g. 10 minutes. Subsequently, the controller uses the main set-point W.

DELAYED NOZZLE HEAT-UP

For temperature-sensitive materials, HRC 800 provides the possibility of heating the nozzles to the operating temperature only when the blocks have almost reached their set-point temperature. To a great extent, this prevents damage and burnt material at the nozzle tips.

CONTROLLED MOLD HEAT-UP

With large molds, particularly those with long nozzles and very large blocks, it is important to maintain a thermal equilibrium while the mold is being heated up.
For this, the system automatically follows the slowest heating zone to ensure a controlled heating gradient for all the zones up to their set-points.

SET-POINT LOWERING (STANDBY) OR PREHEATING

By pressing the "Standby" switch or via an external signal, a second (lower) set-point can be activated. This second set-point can also be activated with a timer, e.g. to preheat the mold before a new work shift begins.

SET-POINT BOOST

For example, to remove scale from the nozzles during mold heat-up, it is sometimes necessary to raise the nozzle temperatures to a higher value for a short period.
If the "Boost" switch is pressed, all the control loops are switched to a higher set-point. The boost temperature is switched off automatically after a defined time (safety cut-out).

INPUT CIRCUIT MONITORING

In case of a fault in sensor or leads, the built-in monitor provides increased operational safety for the system. The display shows "FbF" or "POL" respectively.
On sensor break, the output value is maintained automatically ("hold" function). The "hold" value is determined as an average output value at regular intervals, provided that the process value is within defined limits. The monitor is triggered on sensor break and with reversed polarity. A corresponding alarm is generated and displayed by the system.

HEATING CURRENT MONITORING AND ALARM

The HRC 800 system is fitted with built-in current monitors. Heating current and the adjustable current limits are displayed for every control loop. The heating current alarm is triggered, if the controller energizes the heating element, but the current remains below the adjusted limit.
Furthermore the system's total current and heating power are displayed.

In addition, the following monitoring functions are made possible by the heating current measurement:

- Failure of heating elements
- Partial heating defects
- Short-circuited solid-state relays.

LEAKAGE CURRENT MONITOR (OPTIONAL)

Heating elements with increased leakage currents (e.g. due to penetrated moisture) can be detected by means of differential current relays.

ALARM FUNCTIONS

Triggered alarms activate the alarm outputs and relays. Control deviations are monitored (comparison of set-point and process value). An upper and a lower limit value can be adjusted for every control loop.

Alarm relays 1 and 2 are configurable as:
a) Measurement value alarm for monitoring the control deviation (set-point/process value).
b) Sensor fault alarm
c) Heating current alarm

OUTPUT "HOLD" IN CASE OF SENSOR BREAK

In order to continue production in case of a sensor fault, the mean output value is maintained ("hold" function).

Via the control system and the alarm relay, the individual KS 800 controller signals the sensor fault break, so that the sensor can be replaced. As soon as the KS 800 detects a valid input signal after replacement, normal control is resumed automatically.
The "hold" value is determined at 1-minute intervals, provided that the process value is within an adjustable response threshold (e.g. Xw = ±2K). To prevent excessively high output values, which would cause overheating in case of a sensor break, the "hold" output value can be limited.

SELF-TUNING

Self-tuning is a standard feature for automatic determination of the best control parameters. The function is started either automatically after power up or on demand. Self-tuning also works with the activated start-up function.

For applications with adjacent heating zones and strong thermal coupling, synchronous self-tuning can be started for the loops involved. Alternatively, the control parameters can be configured individually for every control loop.

CONFIGURABLE DIGITAL INPUTS

The HRC 800 has 3 digital inputs that can be used for remote activation of the following functions:
Input 1: Set-point lowering (standby)
Input 2: Set-point boost
Input 3: Heating off (all control outputs disabled)

TECHNICAL DATA

INPUTS

Thermocouples

Type J to DIN IEC 584 (other types can be configured)
Display: in °C or °F (temperature-linear)
Measurement error: 1K ±1 digit (for Types L, J, K)
Input resistance: =1MΩ
TC break monitor: sensor current ≤1 µA.
Polarity monitoring: responds when input signal is 30 K below span start.
Temperature compensation: built in (sensor leads must be taken up to the control cabinet).

Digital inputs

3 digital inputs are available for remote control of the following functions:
– Set-point lowering (standby)
– Set-point boost
– Heating off (all control outputs disabled)

Nominal external voltage: 24 VDC
Current requirement: approx. 5 mA

OUTPUTS

There are 2 alarm outputs, e.g. for:
1) Signal light
2) Horn
or for machine switch-off.

Relay contacts

Potential-free, normally open.
Contact rating:
max. 250 VAC; 1 A; 500 VA; resistive load
min. 10 VDC; 0,05 A; 1 VA

Various relay functions are configurable.

POWER SUPPLY

Three-phase 400/230 VAC; -15...+20%; 48...62 Hz, (with neutral and protective earth leads)

Total power consumption
Connected heating power plus approx. 350 VA Connecting cable: 4m long, with CEE connector

POWER OUTPUTS

Heating current outputs via solid-state relays.
Rating per load circuit:
max. 16 A, 3300 W, 230 VAC (between L and N), resistive load.
Each SSR is protected by a super-fast cartridge fuse.
The load circuits are distributed among the three phases L1, L2 and L3.
The load outputs are taken to heavy-duty connectors.

CONTROL BEHAVIOUR

As positioner with 0...100% duty cycle
As two-point DPID controller

Control parameters

Self-tuning or manually adjustable parameters.

HEATING CURRENT MONITOR

Heating current measurement:
Standard current transformer: 30 A / 30 mA AC.

Display:
Configured for 0,0...30,0 A (reconfigurable)
Measurement error: ± 5 % of display range

Heating current limit
Adjustable within the display range, acts on an alarm relay.
Monitoring for low current and short-circuited SSR.
Trigger level of the short circuit monitor: =1,3 % of max. range (e.g. =0,2 A with 30 A).

SET-POINT

Upper and lower limits of the set-point range are selectable within the measuring range limits.
Configured for 0°C and 400°C.

ENVIRONMENTAL CONDITIONS

Permissible temperatures

For specified accuracy: 0...50°C
For operation: 0...60°C
Storage and transport: -20...60°C

Climatic category

KUF to DIN 40 040
Relative humidity: = 75% yearly average, no condensation

INFLUENCING FACTORS

Power supply

No effect. No loss of configuration data in case of a power supply failure.

ELECTROMAGNETIC COMPATIBILITY

Electromagnetic immunity

Complies with EN 50 082-2

Electrostatic discharge

Test to IEC 801-2
Air discharge: 8 kV
Contact discharge: 4 kV

High-frequency interference

Test to IEC 801-3 (ENV 50 140)
Frequency: 80...1000 MHz, 10 V/m

HF interference on leads

Test to IEC 801-6 (ENV 50 141)
Frequency: 0,15...80 MHz, 10 V
Effect: ≤7 K

Electromagnetic radiation

Complies with EN 50 081-2

ORDERING DATA

Number of control loops	Order number
HRC 800-24 24 control loops	**9407 415 50241**
HRC 800-32 32 control loops	**9407 415 50321**
HRC 800-40 40 control loops	**9407 415 50401**
HRC 800-48 48 control loops	**9407 415 50481**
HRC 800-56 56 control loops	**9407 415 50561**
HRC 800-64 64 control loops	**9407 415 50641**
HRC 800-72 72 control loops	**9407 415 50721**
HRC 800-80 80 control loops	**9407 415 50801**
HRC 800-96 96 control loops	**9407 415 50961**

Systems with more than 96 control loops on request

Accessories	Order number
Connecting cable for sensor input & power output, length 4m, connector 6-pin standard	**9407 415 90111**
Connecting cable for sensor input, length 4m, connector 16-pin standard 1	**9407 415 90121**
Connecting cable for power output, length 4m, connector 16-pin standard 1	**9407 415 90221**
Connecting cable for sensor input & power output, length 4m, connector 16-pin standard 2	**9407 415 90321**
Connecting cable for sensor input, length 4m, connector 24-pin standard 1	**9407 415 90131**
Connecting cable for power output, length 4m, connector 24-pin standard 1	**9407 415 90231**
Connecting cable for sensor input & power output, length 4m, connector 24-pin standard 2	**9407 415 90331**
1 set of connectors for alarms / set-point lowering / boost	**9407 415 90001**

Spare parts	
Super-fast cartridge fuse, 16 A, Qty. 10	**9404 415 11101**

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