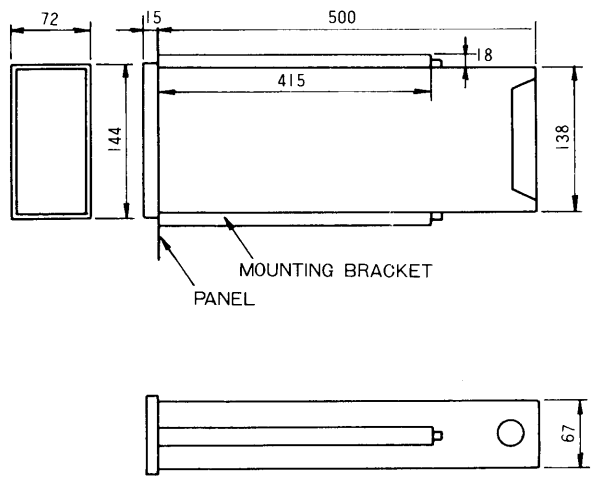
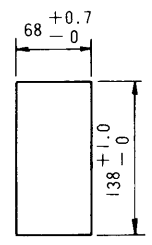
## Connections

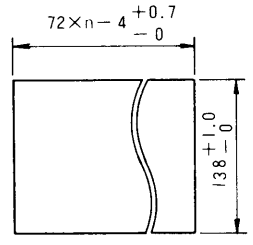
| | | | |
|---|---|---|---|
| 1 | 2 | 23 | 24 |
| 3 | 4 | 25 | 26 |
| 5 | 6 | 27 | 28 |
| 7 | 8 | 29 | 30 |
| 9 | 10 | 31 | 32 |
| 11 | 12 | 33 | 34 |
| 13 | 14 | 35 | 36 |
| 15 | 16 | 37 | 38 |
| 17 | 18 | 39 | 40 |
| 19 | 20 | 41 | 42 |
| 21 | 22 | 43 | 44 |

| No. | Symbol | Contents | No. | Symbol | Contents |
|---|---|---|---|---|---|
| 1 | +24V | Instrument main power ⊕ | 23 | AIR1 + | 1– 5VDC input ⊕ |
| 2 | SM+24V | Standby manual power ⊕ | 24 | AIR1 – | 1– 5VDC input ⊖ |
| 3 | AO1I + | 4 – 20mADC output ⊕ | 25 | AIR2 + | 1 – 5VDC input ⊕ |
| 4 | AO1I – | 4 – 20mADC output ⊖ | 26 | AIR2 – | 1 – 5VDC input ⊖ |
| 5 | AO1V + | 1 – 5VDC output ⊕ | 27 | AIR3 + | 1 – 5VDC input ⊕ |
| 6 | AO1V – | 1 – 5VDC output ⊖ | 28 | AIR3 – | 1 – 5VDC input ⊖ |
| 7 | AO2 + | 1 – 5VDC output ⊕ | 29 | AIR4 + | 1 – 5VDC input ⊕ |
| 8 | AO2 – | 1 – 5VDC output ⊖ | 30 | AIR4 – | 1 – 5VDC input ⊖ |
| 9 | AO3 + | 1 – 5VDC output ⊕ | 31 | AIR5 + | 1 – 5VDC input ⊕ |
| 10 | AO3 – | 1 – 5VDC output ⊖ | 32 | AIR5 – | 1 – 5VDC input ⊖ |
| 11 | 0V | Power common | 33 | 0V | Interlock, DI1 to 4 common |
| 12 | 0V | DO1 to 3, S common | 34 | DI1 | Digital input 1 |
| 13 | DO2 | Digital output 2 | 35 | DI2 | Digital input 2 |
| 14 | DO3 | Digital output 3 | 36 | DI3 | Digital input 3 |
| 15 | DO1 | Digital output 1 | 37 | INT'K | External interlock signal input |
| 16 | S | Standby mode | 38 | DI4 | Digital input 4 |
| 17 | SMPV + | For standby unit, PV ⊕ | 39 | – | – |
| 18 | SMPV – | For standby unit, PV ⊖ | 40 | – | – |
| 19 | – | – | 41 | – | – |
| 20 | – | – | 42 | – | – |
| 21 | GND | Ground | 43 | – | – |
| 22 | – | – | 44 | – | – |

## Dimensions




**PANEL CUT-OUT**

### Ordering Information

*When ordering, please specify:*

1) Model No.
2) Measuring range
3) Tag No.

* Specifications are subject to change without notice.

**Yamatake-Honeywell Co, Ltd.**
**Process Control Division**

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8202-3K-D

**Yamatake-Honeywell** **SPECIFICATION**

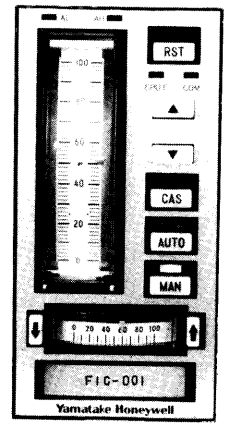
# DIGITRONIK LINE PROGRAMMABLE CONTROLLER

## MODEL : KMM

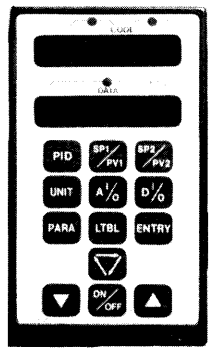
### General

The DigitroniK Line Programmable Controller (Model KMM) is a digital controller with distributed functions expanded to a single-loop level. It is a compact instrument with the PID control functions and various other auxiliary functions. Its features can be summarized as follows:

- Various control and computational functions
- High-precision operational control functions
- Self-diagnostic function
- Auto-balance function
- Standardized input processing functions (temperature/pressure compensation, square-root extraction, linearization, and filtering)
- Casing size meeting international standard (IEC)




**Programmable Controller**




**Data Setting Unit**

### Functional Structure

The Programmable Controller has 30 computational units and 45 algorithms. By assigning appropriate algorithms to respective computational units and connecting them as required, a large number of computational control and functions can be realized.

| | | |
|---|---|---|
| Number of computational units: | | 30 |
| Number of algorithums: | | 45 |
| Variable parameters: | % type | 20 |
| | Time type | 5 |
| Fixed parameters: | Any required number | |

Functions of the Programmable Controller are defined by setting up in it the following types of configuration data.

Basic data:
Data to select type of control, scan frequency, and other basic items of Programmable Controller operation.

Input processing data:
Data to select input processing functions.

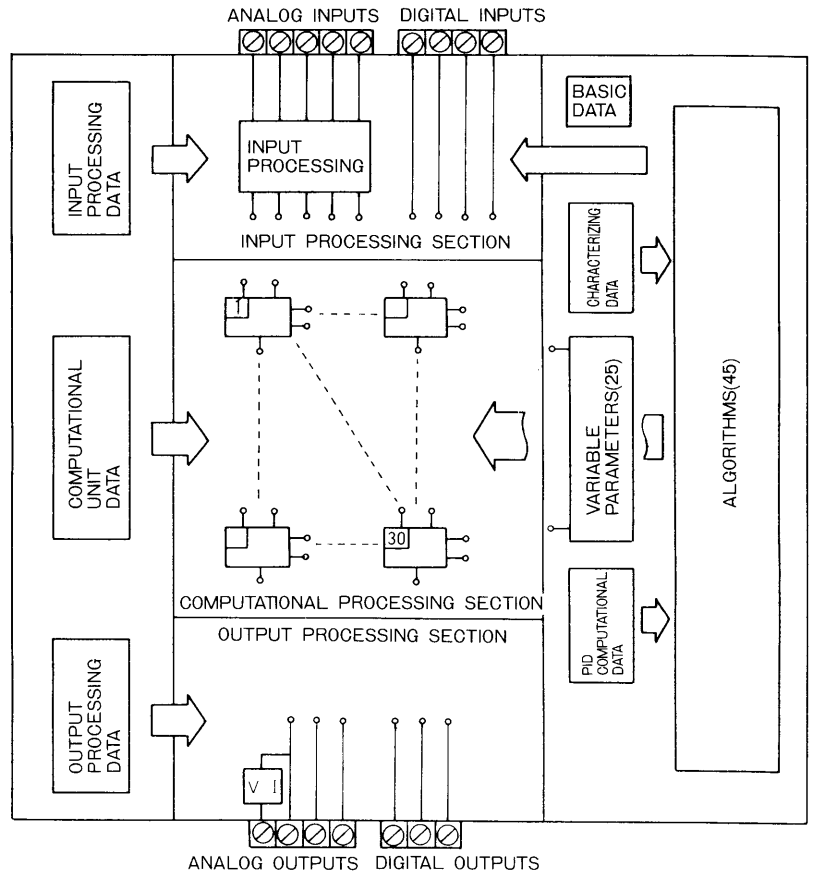
Computational unit data:
Data to select algorithms to be used by computational units and to select connections of computational units.

Characterizing data:
Data of broken-line table (data on breaking points).

PID computational data:
Data on control parameter for PID algorithms.

Output processing data:
Data to dictate signals to be sent out for external use.

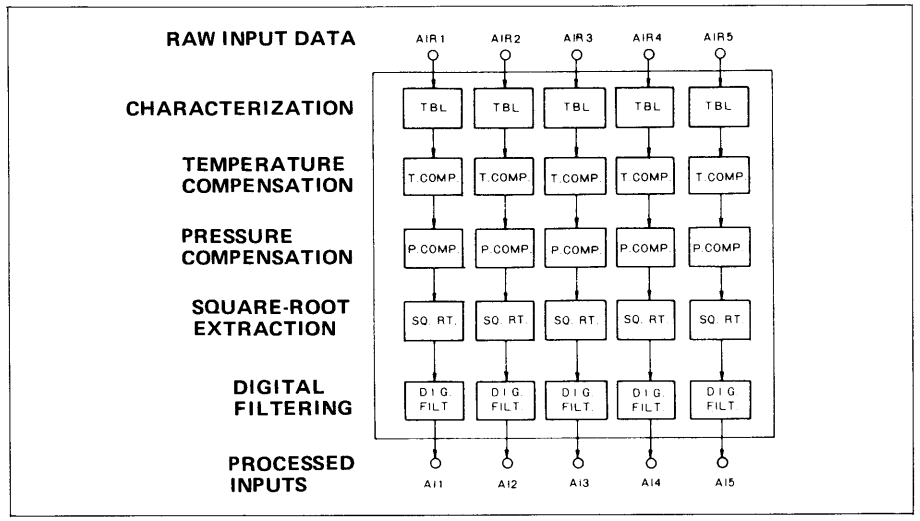
### Functional Block Diagram




Issue 1 Feb., 1982

## Input Processing Function

The Programmable Controller is capable of accepting and processing five analog inputs as illustrated.




## Algorithms

| No. | Algorithms | | Description |
|---|---|---|---|
| | Name | Symbol | |
| 1 | **Addition** | ADD | OUT = P1 ✳ H1 + P2 ✳ H2 |
| 2 | **Subtraction** | SUB | OUT = P1 ✳ H1 − P2 ✳ H2 |
| 3 | **Multiplication** | MUL | OUT = H1 ✳ H2 |
| 4 | **Division** | DVD | OUT = H1 / H2 + P1 |
| 5 | **Absolute Value** | ABS | OUT = \| H1\| |
| 6 | **Square Root Extraction** | SQR | OUT = $\sqrt{H1}$ |
| 7 | **Maximum Value** | MAX | OUT = MAX (H1, H2, P1, P2) |
| 8 | **Minimum Value** | MIN | OUT = MIN (H1, H2, P1, P2) |
| 9 | **4-point Addition** | SGM | OUT = H1 + H2 + P1 + P2 |
| 10 | **High Select** | HSE | OUT = HI SELECT (H1, H2) |
| 11 | **Low Limit** | LLM | Limiting at low limit value (H2). |
| 12 | **Low Select** | LSE | OUT = LO SELECT (H1, H2) |
| 13 | **High Limit** | HLM | Limiting at high limit value (H2). |
| 14 | **High Monitor** | HMS | Output turned on when higher than Hi monitor value (H2). |
| 15 | **Low Monitor** | LMS | Output turned on when lower than Lo monitor value (H2). |
| 16 | **Deviation Monitor** | DMS | Output turned on when higher than deviation monitor value (H2). |
| 17 | **Deviation Rate Limit** | DRL | Deviation rate limited within H2 or −P1 % / minute. |
| 18 | **Deviation Rate Monitor** | DRM | Output turned on when deviation rate is more than H2 or −P1 % / minute. |
| 19 | **Manual Output** | MAN | Operation with manual loader. |
| 20 | **Controller #1** | PID1 | PID Control |
| 21 | **Controller #2** | PID2 | PID Control |
| 22 | **Dead Time** | DED | OUT = e−P1S ✳ H1 |
| 23 | **Lead/Lag** | L/L | OUT = (1 + P1S) / (1 + P2S) ✳ H1 |
| 24 | **Derivative** | LED | OUT = P1S / (1 + P2S) ✳ H2 |
| 25 | **Moving Averages** | MAV | OUT = $\frac{1}{16}\sum_{i=1}^{16} H1\left(\frac{i}{16} P1\right)$ (P1: Input at P1 minutes ago) |
| 26 | **Flip-Flop** | RS | RS flip-flop |
| 27 | **Logical Product** | AND | OUT = H1 ∧ H2 |
| 28 | **Logical Sum** | OR | OUT = H1 ∨ H2 |
| 29 | **Exclusive Logical Sum** | XOR | OUT = H1 ⊻ H2 |
| 30 | **Invert** | NOT | OUT = $\overline{H1}$ |
| 31 | **2-point Switch** | SW | H1/H2 selector switch |
| 32 | **Bumpless Transfer Switching** | SFT | Switching with bump suppression. |
| 33 | **Timer** | TIM | Pulse generation per P1 minutes. |
| 34 | **Integration Pulse Output** | CPO | Pulse number output proportional to input H2. |
| 35 | **Ramp Wave Generation** | RMP | Output increase at constant rate. |
| 36 | **Pulse Width Modulation** | PWM | Pulse output with duty ratio proportional to input H1, with period P1. |
| 37 | **Characterization Table #1** | TBL 1 | Characterization table #1 (10 breaking points) |
| 38 | **Characterization Table #2** | TBL 2 | Characterization table #2 (10 breaking points) |
| 39 | **Characterization Table #3** | TBL 3 | Characterization table #3 (10 breaking points) |
| 40 | **Reverse Characterizer Table #1** | TBR 1 | Reverse function of characterization table #1. |
| 41 | **Reverse Characterizer Table #2** | TBR 2 | Reverse function of characterization table #2. |
| 42 | **Reverse Characterizer Table #3** | TBR 3 | Reverse function of characterization table #3. |
| 43 | **Control Parameter Change #1** | PMD 1 | Change of control of PID 1. |
| 44 | **Control Parameter Change #2** | PMD 2 | Change of control of PID 2. |
| 45 | **Mode Select** | MOD | M/A/C/F mode change |

## Model Number Table

Ex: KMM100-00-000

| Basic Model No. | Selections | | Options | | | Description |
|---|---|---|---|---|---|---|
| | I | II | I | II | III | |
| KMM | | | | | | Programmable Controller |
| 100 | | | | | | Front mask type: AUTO/MAN, SP operation possible |
| 200 | | | | | | Front mask type: AUTO/MAN/CAS, SP operation possible |
| 300 | | | | | | Front mask type: AUTO/MAN, SP operation not possible |
| | −0 | | | | | Main power supply: DC24V |
| | | 0 | | | | PROM generation: To be prepared by customer |
| | | 1 | | | | PROM generation: Prepared by Yamatake-Honeywell |
| | | | −0 | | | Without communication interface |
| | | | −1 | | | With communication interface |
| | | | | 0 | | Without data setting unit |
| | | | | 1 | | With data setting |
| | | | | | 0 | Without standby manual unit |
| | | | | | 1 | With standby manual unit (preset type) |
| | | | | | 2 | With standby manual unit (follow-up type) |

## Specifications

| Item | | | | Specifications |
|---|---|---|---|---|
| Input Section | Analog Input | | **No. of inputs** | 5 points |
| | | | **Input voltage** | 1 to 5V DC |
| | | | **Input bias current** | −1 μA maximum |
| | | | **Receiving system** | Differential type receive |
| | | | **Allowable input overvoltage** | ±30V DC maximum |
| | Digital Input | | **No. of inputs** | Four programmable signals and one external interlock signal |
| | | | **Input voltage** | Low: 0 to 4V, High: 10 to 30V |
| | | | **Input bias current** | Low: −3mA or less, High: 10μA or less |
| | | | **Input system** | Diode isolation system |
| | | | **Allowable input overvoltage** | ±30V DC maximum |
| Output Section | Analog Output | Voltage | **No. of output** | 3 points |
| | | | **Output voltage** | 1 to 5V DC |
| | | | **Output impedance** | 250Ω |
| | | | **Output system** | Differential output system |
| | | Current | **No. of output** | 1 point (One of voltage outputs is V/I-converted). |
| | | | **Output current** | 4 to 20 mA DC |
| | | | **Output impedance** | 250 kΩ |
| | | | **Allowable load** | 600Ω |
| | | | **Output System** | Negative common (standard)<br>Possitive common (optional Y-176A) |
| | Digital Output | | **No. of output** | Three programmable points and one standby mode output point |
| | | | **Output system** | Transistor output (open collector) |
| | | | **Contact rating** | DC 30V, 0.1A (resistive load) |
| Indicator Section | Input | | **No. of indication** | PV: 1 point (red), SP: 1 point (green), with memory pointer |
| | | | **Accuracy** | ±1% FS |
| | | | **Type of indicator** | Moving coil type |
| | Output | | **No. of indication** | 1 point (with memory pointer) |
| | | | **Accuracy** | ±3% FS |
| | | | **Type of indicator** | Moving coil type |
| | Alarm | | **No. of indication** | 4 points (process alarm: 1PVH, 1PVL, equipment alarm: 1, communication alarm: 1) |
| | | | **Indication devices** | LED lamps |
| Operating Section | | | **Operation control buttons** | SP increase/decrease buttons: 2<br>Output increase/decrease buttons: 2<br>Mode selector buttons: 3 (with LED lamp)<br>Reset button: 1 (with LED lamp) |
| | | | **Data setting unit (on side panel, optional)** | Data display windows: 2 (5 digits each)<br>No. of setting buttons: 13 |
| | | | **Auxiliary switches (on side panel)** | Data entry: 1<br>Display change: 1<br>Direct/reverse selector: 2<br>Initial start: 1<br>Higher-order setting enabling: 1 |
| | | | **Standby manual unit (optional)** | No. of indication: 1 (with output/PV selector switch)<br>Indicating accuracy: ±3% FS<br>Type of indicator: Moving coil type<br>Power supply: DC 24V $^{+15\%}_{-10\%}$<br>Output impedance: 250kΩ<br>Allowable load resistance: 500Ω<br>Type of unit: Preset type or follow-up type (as specified by model No.) |
| General Specification | | | **Power supply** | DC 24V $^{+15\%}_{-10\%}$ |
| | | | **Power consumption** | 400 mA maximum (DC24V) |
| | | | **Signal connections** | At instrument rear, wire dia. 1.25mm$^2$ maximum |
| | | | **Power interruption/Failure** | DC16V or over, within 200 msec.<br>(Parameters are maintained for approximately 72 hours after power failure. Initial parameters are nonvolatile.) |
| | | | **Ambient temperature** | 0 to 50°C |
| | | | **Ambient humidity** | 10 to 90% RH |
| | | | **Weight** | 6 kg |