ECLA   EUROPEAN CLASSIFICATION

G05B   **CONTROL OR REGULATING SYSTEMS IN GENERAL; FUNCTIONAL ELEMENTS OF SUCH SYSTEMS; MONITORING OR TESTING ARRANGEMENTS FOR SUCH SYSTEMS OR ELEMENTS** (fluid-pressure actuators or systems acting by means of fluids in general F15B; valves per se F16K; characterised by mechanical features only G05G; sensitive elements, see the appropriate subclass, e.g. G12B, subclass of G01, H01; correcting units, see the appropriate subclass, e.g. H02K)

Notes

1. This subclass covers features of control systems or elements for regulating specific variables, which are clearly more generally applicable.

2. This subclass does not cover applications of such systems or elements, which are covered by subclass G05D or G05F.

3. In this subclass, the following terms or expressions are used with the meanings indicated :

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   - "automatic controller" means a system, circuit, or device
     in which a signal from the detecting element is compared
     with a signal representing the desired value and which
     operates in such a way as to reduce the deviation. The
     automatic controller generally does not include the
   sensitive
     element, i.e. that element which measures the value of the
     condition to be corrected, or the correcting element, i.e.
     that element which adjusts the condition to be corrected;
   - "electric" includes "electromechanical", "electrohydraulic"
     or "electropneumatic".
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4. In this subclass, details or specific control systems are classified in the group relevant to that system, if not otherwise provided for.

G05B1/00   **Comparing elements, i.e. elements for effecting comparison directly or indirectly between a desired value and existing or anticipated values** (comparing phase or frequency of two electric signals H03D13/00)

G05B1/01	. electric
G05B1/02	. . for comparing analogue signals
G05B1/02A	. . . [N: using discharge tubes]
G05B1/02B	. . . [N: using inductance means]
G05B1/02C	. . . [N: using impedance bridges]
G05B1/03	. . for comparing digital signals
G05B1/04	. . with sensing of the position of the pointer of a measuring instrument
G05B1/06	. . . continuous sensing
G05B1/08	. . . stepwise sensing
G05B1/11	. fluidic

G05B5/00   **Anti-hunting arrangements**

G05B5/01   . electric

G05B5/04   . fluidic

G05B6/00   **Internal feed-back arrangements for obtaining particular characteristics, e.g. proportional, integral, differential** (in automatic controllers G05B11/00)

G05B6/02   . electric

G05B6/05   . fluidic

G05B7/00   **Arrangements for obtaining smooth engagement or disengagement of automatic control**

G05B7/02   . electric

G05B7/04   . fluidic

G05B9/00   **Safety arrangements** (G05B7/00 takes precedence; safety arrangements in programme-control systems G05B19/048, G05B19/406; safety valves F16K17/00; emergency protective circuit arrangements in general H02H)

G05B9/02   . electric
G05B9/03   . . with multiple-channel loop, i.e. redundant control systems

G05B9/05   . fluidic

G05B11/00   **Automatic controllers** (G05B13/00 takes precedence)

G05B11/01   . electric
G05B11/01A   . . [N: details of the correcting means]
G05B11/01B   . . [N: details of the transmission means]
G05B11/01B1   . . . [N: using discharge tubes]
G05B11/01B2   . . . [N: using rotating amplifiers]
G05B11/01B3   . . . [N: using inductance means]
G05B11/01B4   . . . [N: using photo-electric means]
G05B11/01B5   . . . [N: using thermal amplifiers]
G05B11/06   . . in which the output signal represents a continuous function of the deviation from the desired value, i.e. continuous controllers (G05B11/26 takes precedence)
G05B11/10   . . . the signal transmitted being dc
G05B11/12   . . . the signal transmitted being modulated on an ac carrier
G05B11/14   . . in which the output signal represents a discontinuous function of the deviation from the desired value, i.e. discontinuous controllers (G05B11/26 takes precedence)

G05B11/16	. . .	Two-step controllers, e.g. with on-off action
G05B11/18	. . .	Multi-step controllers
G05B11/26	. .	in which the output signal is a pulse-train
G05B11/28	. . .	using pulse-height modulation; using pulse-width modulation
G05B11/30	. . .	using pulse-frequency modulation
G05B11/32	. .	with inputs from more than one sensing element; with outputs to more than one correcting element
G05B11/36	. .	with provision for obtaining particular characteristics, e.g. proportional, integral, differential
G05B11/38	. . .	for obtaining a proportional characteristic
G05B11/40	. . .	for obtaining an integral characteristic
G05B11/42	. . .	for obtaining a characteristic which is both proportional and time-dependent, e.g. P.I., P.I.D.
G05B11/44	.	pneumatic only
G05B11/46	. .	without auxiliary power
G05B11/48	. .	with auxiliary power
G05B11/50	. . .	in which the output signal represents a continuous function of the deviation from the desired value i.e. continuous controllers
G05B11/52	. . .	in which the output signal represents a discontinuous function of the deviation from the desired value, i.e. discontinuous controllers
G05B11/54	. . . .	Two-step controllers, e.g. with on-off action
G05B11/56	. . . .	Multi-step controllers
G05B11/58	. .	with inputs from more than one sensing element; with outputs to more than one correcting element
G05B11/60	.	hydraulic only
G05B13/00		**Adaptive control systems, i.e. systems automatically adjusting themselves to have a performance which is optimum according to some preassigned criterion** (G05B19/00 takes precedence; details of the computer G06F15/18)
G05B13/02	.	electric
G05B13/02A	. .	[N: not using a model or a simulator of the controlled system]
G05B13/02A1	. . .	[N: in which a variable is automatically adjusted to optimise the performance]
G05B13/02A1A	. . . .	[N: using trial and error method, including "peak-holding"]
G05B13/02A1B	. . . .	[N: using a perturbation of the variable]
G05B13/02A1B1	. . . . .	[N: being a periodic perturbation]
G05B13/02A1B2	. . . . .	[N: being a random or a self-induced perturbation]
G05B13/02A1C	. . . .	[N: using steepest descent or ascent method]
G05B13/02A2	. . .	[N: in which a parameter or coefficient is automatically adjusted to optimise the performance]
G05B13/02A2A	. . . .	[N: not using a perturbation signal]
G05B13/02A2B	. . . .	[N: using a perturbation signal]
G05B13/02A3	. . .	[N: the criterion being a time-optimal performance criterion]
G05B13/02A4	. . .	[N: using a predictor]

G05B13/02C   . .   [N: the criterion being a learning criterion]

G05B13/02C1   . . .   [N: using neural networks only] [N9410]

G05B13/02C2   . . .   [N: using fuzzy logic only] [N9410]

G05B13/02C3   . . .   [N: using expert systems only] [N9410]

G05B13/02C4   . . .   [N: using neural networks and fuzzy logic] [N9410]

G05B13/02C5   . . .   [N: using neural networks and expert systems] [N9410]

G05B13/02C6   . . .   [N: using fuzzy logic and expert systems] [N9410]

G05B13/04   . .   involving the use of models or simulators

G05B13/04A   . . .   [N: in which a variable is automatically adjusted to optimise the performance]

G05B13/04B   . . .   [N: in which a parameter or coefficient is automatically adjusted to optimise the performance]

G05B13/04B1   . . . .   [N: not using a perturbation signal]

G05B13/04B2   . . . .   [N: using a perturbation signal]

G05B13/04C   . . .   [N: the criterion being a time optimal performance criterion]

G05B13/04D   . . .   [N: using a predictor]

G05B15/00   **Systems controlled by a computer** (G05B13/00, G05B19/00 take precedence; automatic controllers with particular characteristics G05B11/00; computers per se G06)

G05B15/02   .   electric

G05B17/00   **Systems involving the use of models or simulators of said systems** (G05B13/00, G05B15/00, G05B19/00 take precedence; analogue computers for specific processes, systems, or devices, e.g. simulators G06G7/48)

G05B17/02   .   electric

G05B19/00   **Programme-control systems (specific applications see the relevant places, e.g. A47L15/46; clocks with attached or built-in means operating any device at a preselected time interval G04C23/00; marking or sensing record carriers with digital information G06K; information storage G11; time or time-programme switches which automatically terminate their operation after the programme is completed H01H43/00)** [C0610]

G05B19/02   .   electric

G05B19/04   . .   Programme control other than numerical control, i.e. in sequence controllers or logic controllers (G05B19/418 takes precedence; numerical control G05B19/18)

G05B19/04D   . . .   [N: Programme-control specially adapted for machine tool control and not otherwise provided for (B23Q takes precedence; G05B19/06 to G05B19/16 take precedence)]

G05B19/04F   . . .   [N: Function-oriented details]

G05B19/04F1   . . . .   [N: adapting phase duration according to measured parameters]

G05B19/042   . . .   using digital processors (G05B19/05 takes precedence)

G05B19/042M   . . . .   [N: Multiprocessor system]

G05B19/042N   . . . .   [N: Input/output]

G05B19/042N1   . . . . .   [N: Safety, monitoring]

G05B19/042P   . . . .   [N: Programming the control sequence]

G05B19/042S   . . . .   [N: Safety, monitoring (G05B19/042N takes precedence)]

G05B19/045   . . .   using logic state machines, consisting only of a memory or a programmable logic device containing the logic for the controlled machine and in which the state of its outputs is dependent on the state of its inputs or part of its own output states, e.g. binary decision controllers, finite state controllers

G05B19/048   . . .   Monitoring; Safety

G05B19/05   . . .   Programmable logic controllers, e.g. simulating logic interconnections of signals according to ladder diagrams or function charts

G05B19/05M   . . . .   [N: Linking several PLC`s]

G05B19/05N   . . . .   [N: Input/output]

G05B19/05P   . . . .   [N: Programming the PLC]

G05B19/05S   . . . .   [N: Safety, monitoring]

G05B19/06   . . .   using cams, discs, rods, drums, or the like (mechanical programme-control apparatus G05G21/00)

G05B19/06B   . . . .   [N: for sequential programme-control without delivering a reference value]

G05B19/06C   . . . .   [N: for delivering "step function", a slope function or a continuous function]

G05B19/07   . . .   where the programme is defined in the fixed connection of electrical elements, e.g. potentiometers, counters, transistors

G05B19/07R   . . . .   [N: for delivering a step function, a slope or a continuous function (G05B19/06 takes precedence; function generators per se H03K, G06G)]

G05B19/08   . . .   using plugboards, cross-bar distributors, matrix switches, or the like

G05B19/10   . . .   using selector switches

G05B19/10I   . . . .   [N: for input of programme steps, i.e. setting up sequence]

G05B19/10I1   . . . . .   [N: characterised by physical layout of switches; switches co-operating with display; use of switches in a special way]

G05B19/10S   . . . .   [N: for selecting a programme, variable or parameter]

G05B19/10S1   . . . . .   [N: characterised by physical layout of switches; switches co-operating with display; use of switches in a special way]

G05B19/12   . . .   using record carriers

G05B19/12C   . . . .   [N: using cards, tapes or discs having conductive paths (G05B19/12W takes precedence)]

G05B19/12L   . . . .   [N: using tapes, cards or discs with optically sensed marks or codes (G05B19/12W, G05B19/14 take precedence)]

G05B19/12P   . . . .   [N: using cards, tapes or discs having protuberances (G05B19/12W takes precedence)]

G05B19/12W   . . . .   [N: the workpiece itself serves as a record carrier, e.g. by its form, by marks or codes on it]

G05B19/14   . . . .   using punched cards or tapes [N: G05B19/12W takes precedence]

G05B19/16   . . . .   using magnetic record carriers [N: G05B19/12W takes precedence]

G05B19/18   . .   Numerical control (NC), i.e. automatically operating machines, in particular machine tools, e.g. in a manufacturing environment, so as to execute positioning, movement or co-ordinated operations by means of programme data in numerical form (G05B19/418 takes precedence)

G05B19/18B   . . .   [N: characterised by the machine tool function, e.g. thread cutting, cam making, tool direction control (G05B19/21 to G05B19/40 take precedence)]

G05B19/18B4   . . . .   [N: Generation of cam-like surfaces]

G05B19/18B5   .   .   .   .   [N: Generation of screw- or gearlike surfaces]

G05B19/18F   .   .   .   [N: characterised by special applications and not provided for in the relevant subclasses, (e.g. making dies, filament winding)]

G05B19/19   .   .   .   characterised by positioning or contouring control systems, e.g. to control position from one programmed point to another or to control movement along a programmed continuous path

Note:
In this group, the measuring system for an axis is used to measure the displacement along that axis. This measurement is used as position-feedback in the servo-control system.

G05B19/19S   .   .   .   .   [N: Controlling the position of several slides on one axis]

G05B19/21   .   .   .   .   using an incremental digital measuring device

G05B19/23   .   .   .   .   .   for point-to-point control

G05B19/23C   .   .   .   .   .   .   [N: the positional error is used to control continuously the servomotor according to its magnitude]

G05B19/23C1   .   .   .   .   {7 dots} [N: with speed feedback only]

G05B19/23C2   .   .   .   .   {7 dots} [N: with current or torque feedback only]

G05B19/23C3   .   .   .   .   {7 dots} [N: with force or acceleration feedback only]

G05B19/23C4   .   .   .   .   {7 dots} [N: with a combination of feedback covered by G05B19/23C1 to G05B19/23C3]

G05B19/23S   .   .   .   .   .   .   [N: the positional error is only used to control speed in steps according to distance left, or to give a stop signal when error reaches zero]

G05B19/25   .   .   .   .   .   for continuous-path control

G05B19/25C   .   .   .   .   .   .   [N: the positional error is used to control continuously the servomotor according to its magnitude]

G05B19/25C1   .   .   .   .   {7 dots} [N: with speed feedback only]

G05B19/25C2   .   .   .   .   {7 dots} [N: with current or torque feedback only]

G05B19/25C3   .   .   .   .   {7 dots} [N: with force or acceleration feedback only]

G05B19/25C4   .   .   .   .   {7 dots} [N: with a combination of feedback covered by G05B19/25C1 to G05B19/25C3]

G05B19/27   .   .   .   .   using an absolute digital measuring device

G05B19/29   .   .   .   .   .   for point-to-point control

G05B19/29C   .   .   .   .   .   .   [N: the positional error is used to control continuously the servomotor according to its magnitude]

G05B19/29C1   .   .   .   .   {7 dots} [N: with speed feedback only]

G05B19/29C2   .   .   .   .   {7 dots} [N: with current or torque feedback only]

G05B19/29C3   .   .   .   .   {7 dots} [N: with force or acceleration feedback only]

G05B19/29C4   .   .   .   .   {7 dots} [N: with a combination of feedback covered by G05B19/29C1 to G05B19/29C3]

G05B19/31   .   .   .   .   .   for continuous-path control

G05B19/31C   .   .   .   .   .   .   [N: the positional error is used to control continuously the servomotor according to its magnitude]

G05B19/31C1   .   .   .   .   {7 dots} [N: with speed feedback only]

G05B19/31C2   .   .   .   .   {7 dots} [N: with current or torque feedback only]

G05B19/31C3   .   .   .   .   {7 dots} [N: with force or acceleration feedback only]

G05B19/31C4   .   .   .   .   {7 dots} [N: with a combination of feedback covered by

5B19/31C1 to G05B19/31C3]

G05B19/33	. . . .	using an analogue measuring device
G05B19/35	. . . . .	for point-to-point control
G05B19/35C	. . . . . .	[N: the positional error is used to control continuously the servomotor according to its magnitude]
G05B19/35C1	. . . .	{7 dots} [N: with speed feedback only]
G05B19/35C2	. . . .	{7 dots} [N: with current or torque feedback only]
G05B19/35C3	. . . .	{7 dots} [N: with force or acceleration feedback only]
G05B19/35C4	. . . .	{7 dots} [N: with a combination of feedback covered by G05B19/35C1 to G05B19/35C3]
G05B19/37	. . . . .	for continuous-path control
G05B19/37C	. . . . . .	[N: the positional error is used to control continuously the servomotor according to its magnitude]
G05B19/37C1	. . . .	{7 dots} [N: with speed feedback only]
G05B19/37C2	. . . .	{7 dots} [N: with current or torque feedback only]
G05B19/37C3	. . . .	{7 dots} [N: with force or acceleration feedback only]
G05B19/37C4	. . . .	{7 dots} [N: with a combination of feedback covered by G05B19/37C1 to G05B19/37C3]
G05B19/39	. . . .	using a combination of the means covered by at least two of the preceding sub-groups G05B19/21, G05B19/27, and G05B19/33
G05B19/40	. . . .	Open loop systems, e.g. using stepping motor
G05B19/401	. . .	characterised by control arrangements for measuring, e.g. calibration and initialisation, measuring workpiece for machining purposes (G05B19/19 takes precedence)
G05B19/401C	. . . .	[N: going to a reference at the beginning of machine cycle, e.g. for calibration]
G05B19/402	. . .	characterised by control arrangements for positioning, e.g. centring a tool relative to a hole in the workpiece, additional detection means to correct position (G05B19/19 takes precedence)
G05B19/404	. . .	characterised by control arrangements for compensation, e.g. for backlash, overshoot, tool offset, tool wear, temperature, machine construction errors, load, inertia (G05B19/19, G05B19/41 take precedence)
G05B19/406	. . .	characterised by monitoring or safety (G05B19/19 takes precedence)
G05B19/4061	. . . .	Avoiding collision or forbidden zones
G05B19/4062	. . . .	Monitoring servoloop, e.g. overload of servomotor, loss of feedback or reference
G05B19/4063	. . . .	Monitoring general control system (G05B19/4062 takes precedence)
G05B19/4065	. . . .	Monitoring tool breakage, life or condition
G05B19/4067	. . . .	Restoring data or position after power failure or other interruption
G05B19/4068	. . . .	Verifying part programme on screen, by drawing or other means
G05B19/4069	. . . .	Simulating machining process on screen (G05B19/4068 takes precedence)
G05B19/408	. . .	characterised by data handling or data format, e.g. reading, buffering or conversion of data
G05B19/408A	. . . .	[N: Adapting programme, configuration]
G05B19/408C	. . . .	[N: Coordinate conversions; Other special calculations]
G05B19/409	. . .	characterised by using manual input (MDI) or by using control panel, e.g. controlling functions with the panel; characterised by control panel details, by

					setting parameters (G05B19/408, G05B19/4093 take precedence)
G05B19/4093	.	.	.		characterised by part programming, e.g. entry of geometrical information as taken from a technical drawing, combining this with machining and material information to obtain control information, named part programme, for the NC machine
G05B19/4093G	.	.	.	.	[N: concerning programming of geometry]
G05B19/4093G1	.	.	.	.	. [N: Shape input]
G05B19/4093G1T	.	.	.	.	. . [N: Selecting figure elements from a menu table]
G05B19/4093G2	.	.	.	.	. [N: Selection of predetermined shapes and defining the dimensions with parameter input]
G05B19/4093G3	.	.	.	.	. [N: Defining geometry with a high level language]
G05B19/4093M	.	.	.	.	[N: concerning programming of machining or material parameters, pocket machining]
G05B19/4093M1	.	.	.	.	. [N: Tool management]
G05B19/4097	.	.	.		characterised by using design data to control NC machines, e.g. CAD/CAM (G05B19/4093 takes precedence; CAD in general G06F17/50)
G05B19/4099	.	.	.		Surface or curve machining, making 3D objects, e.g. desktop manufacturing
G05B19/41	.	.	.		characterised by interpolation, e.g. the computation of intermediate points between programmed end points to define the path to be followed and the rate of travel along that path (G05B19/25, G05B19/31, G05B19/37, G05B19/39, G05B19/40 take precedence)
G05B19/4103	.	.	.	.	Digital interpolation
G05B19/4105	.	.	.	.	Analog interpolation
G05B19/414	.	.	.		Structure of the control system, e.g. common controller or multiprocessor system, interface to servo, programmable interface controller
G05B19/414A	.	.	.	.	[N: characterised by a controller or microprocessor per axis]
G05B19/414K	.	.	.	.	[N: characterised by the use of a microprocessor (G05B19/414A takes precedence)]
G05B19/414M	.	.	.	.	[N: characterised by using multiplexing for control system]
G05B19/414N	.	.	.	.	[N: characterised by using same processor to execute programmable controller and numerical controller function (CNC) and PC controlled NC (PCNC)]
G05B19/414P	.	.	.	.	[N: characterised by using a programmable interface controller (PIC)]
G05B19/414S	.	.	.	.	[N: characterised by using several processors for different functions, distributed (real-time) systems (G05B19/414A takes precedence)]
G05B19/4155	.	.	.		characterised by programme execution, i.e. part programme or machine function execution, e.g. selection of a programme
G05B19/416	.	.	.		characterised by control of velocity, acceleration or deceleration (G05B19/19 takes precedence)
G05B19/416A	.	.	.	.	[N: Adaptive control of feed or cutting velocity (without NC B23Q15/12)]
G05B19/416F	.	.	.	.	[N: Controlling feed or in-feed (G05B19/416A takes precedence)]
G05B19/418	.	.			Total factory control, i.e. centrally controlling a plurality of machines, e.g. direct or distributed numerical control (DNC), flexible manufacturing systems (FMS), integrated manufacturing systems (IMS), computer integrated manufacturing (CIM)
G05B19/418A	.	.	.		[N: characterised by assembly]
G05B19/418B	.	.	.		[N: characterised by direct numerical control (DNC)]
G05B19/418C	.	.	.		[N: characterised by the cooperation between machine tools, manipulators and conveyer or other workpiece supply system, workcell]

G05B19/418C1	. . . .	[N: manipulators and conveyer only]
G05B19/418C2	. . . .	[N: machine tools and manipulators only, machining centre]
G05B19/418D	. . .	[N: characterised by data acquisition, e.g. workpiece identification]
G05B19/418E	. . .	[N: characterised by programme execution]
G05B19/418F	. . .	[N: characterised by fault tolerance, reliability of production system]
G05B19/418M	. . .	[N: characterised by system universality, reconfigurability, modularity]
G05B19/418N	. . .	[N: characterised by the network communication]
G05B19/418N1	. . . .	[N: by local area network (LAN), network structure]
G05B19/418N2	. . . .	[N: by protocol, e.g. MAP, TOP]
G05B19/418P	. . .	[N: characterised by job scheduling, process planning, material flow]
G05B19/418P1	. . . .	[N: by tool management]
G05B19/418Q	. . .	[N: characterised by quality surveillance of production]
G05B19/418R	. . .	[N: characterised by CIM planning or realisation]
G05B19/418S	. . .	[N: characterised by modeling, simulation of the manufacturing system]
G05B19/418T	. . .	[N: characterised by the transport system]
G05B19/418T1	. . . .	[N: using automatic guided vehicles (AGV) (control of position or course of AGV`s G05D1/00)]
G05B19/42	. .	Recording and play-back systems, i.e. in which the programme is recorded from a cycle of operations, e.g. the cycle of operations being manually controlled, after which this record is played back on the same machine
G05B19/42B	. . .	[N: preparation of the programme medium using a drawing, a model]
G05B19/42B1	. . . .	[N: in which a drawing is traced or scanned and corresponding data recorded]
G05B19/42B2	. . . .	[N: in which a model is traced or scanned and corresponding data recorded]
G05B19/421	. . .	Teaching successive positions by mechanical means, e.g. by mechanically-coupled handwheels to position tool head or end effector (G05B19/423 takes precedence)
G05B19/423	. . .	Teaching successive positions by walk-through, i.e. the tool head or end effector being grasped and guided directly, with or without servo-assistance, to follow a path
G05B19/425	. . .	Teaching successive positions by numerical control, i.e. commands being entered to control the positioning servo of the tool head or end effector
G05B19/427	. . .	Teaching successive positions by tracking the position of a joystick or handle to control the positioning servo of the tool head, master-slave control (G05B19/423 takes precedence)
G05B19/43	.	fluidic
G05B19/44	. .	pneumatic
G05B19/46	. .	hydraulic

G05B21/00   **Systems involving sampling of the variable controlled** (G05B13/00 to G05B19/00 take precedence; transmission systems for measured values G08C; electronic switching or gating H03K17/00)

G05B21/02   . electric

G05B23/00   **Testing or monitoring of control systems or parts thereof** (monitoring of programme-control systems G05B19/048, G05B19/406)

G05B23/02   **.**   Electric testing or monitoring

[N: **WARNING** [N1105]
As from June 1st, 2011 documents of this group are being continuously reclassified to
its subgroups]
]

G05B23/02B   **.**   **.**   [N: in which a transfer function of a process is calculated]

G05B23/02S   **.**   **.**   [N: by means of a monitoring system capable of detecting and responding to faults]
[N1105]

[N: **WARNING** [N1105]
Not complete pending the completion of a reclassification; see also G05B23/02
]

G05B23/02S2   **.**   **.**   **.**   [N: characterized by the configuration of the monitoring system] [N1105]

[N: **WARNING** [N1105]
Not complete pending the completion of a reclassification; see also G05B23/02
]

G05B23/02S2A   **.**   **.**   **.**   **.**   [N: adopting a different treatment of each operating region or a different
mode of the monitored system, e.g. transient modes; different operating
configurations of monitored system] [N1105]

[N: **WARNING** [N1105]
Not complete pending the completion of a reclassification; see also
G05B23/02
]

G05B23/02S2B   **.**   **.**   **.**   **.**   [N: Modular or universal configuration of the monitoring system, e.g.
monitoring system having modules that may be combined to build monitoring
program; monitoring system that can be applied to legacy systems;
adaptable monitoring system; using different communication protocols]
[N1105]

[N: **WARNING** [N1105]
Not complete pending the completion of a reclassification; see also
G05B23/02
]

G05B23/02S2C   **.**   **.**   **.**   **.**   [N: Human interface functionality, e.g. monitoring system providing help to
the user in the selection of tests or in its configuration] [N1105]

[N: **WARNING** [N1105]
Not complete pending the completion of a reclassification; see also
G05B23/02
]

G05B23/02S4   **.**   **.**   **.**   [N: characterised by the fault detection method dealing with either existing or
incipient faults] [N1105]

[N: **WARNING** [N1105]
Not complete pending the completion of a reclassification; see also G05B23/02
]

G05B23/02S4D   **.**   **.**   **.**   **.**   [N: Preprocessing measurements, e.g. data collection rate adjustment;
Standardization of measurements; Time series or signal analysis, e.g.
frequency analysis or wavelets; Trustworthiness of measurements; Indexes
therefor; Measurements using easily measured parameters to estimate
parameters difficult to measure; Virtual sensor creation; De-noising; Sensor
fusion; Unconventional preprocessing inherently present in specific fault

detection methods like PCA-based methods] [N1105]

[N: **WARNING** [N1105]
Not complete pending the completion of a reclassification; see also
G05B23/02
]

G05B23/02S4H . . . . [N: Process history based detection method, e.g. whereby history implies the availability of large amounts of data] [N1105]

[N: **WARNING** [N1105]
Not complete pending the completion of a reclassification; see also
G05B23/02
]

G05B23/02S4H2 . . . . . [N: Qualitative history assessment, whereby the type of data acted upon e.g. waveforms, images or patterns, is not relevant, e.g. rule based assessment; if-then decisions] [N1105]

[N: **WARNING** [N1105]
Not complete pending the completion of a reclassification; see also
G05B23/02
]

G05B23/02S4H2A . . . . . . [N: knowledge based, e.g. expert systems; genetic algorithms] [N1105]

[N: **WARNING** [N1105]
Not complete pending the completion of a reclassification; see also
G05B23/02
]

G05B23/02S4H2B . . . . . . [N: based on qualitative trend analysis, e.g. system evolution] [N1105]

[N: **WARNING** [N1105]
Not complete pending the completion of a reclassification; see also
G05B23/02
]

G05B23/02S4H2C . . . . . . [N: based on a comparison with predetermined threshold or range , e.g. "classical methods", carried out during normal operation; threshold adaptation or choice; when or how to compare with the threshold] [N1105]

[N: **WARNING** [N1105]
Not complete pending the completion of a reclassification; see also
G05B23/02
]

G05B23/02S4H2D . . . . . . [N: based on parallel systems, e.g. comparing signals produced at the same time by same type systems and detect faulty ones by noticing differences among their responses] [N1105]

[N: **WARNING** [N1105]
Not complete pending the completion of a reclassification; see also
G05B23/02
]

G05B23/02S4H4 . . . . . [N: Quantitative history assessment, e.g. mathematical relationships between available data; Functions therefor; Principal component analysis [PCA]; Partial least square [PLS]; Statistical classifiers, e.g. Bayesian networks, linear regression or correlation analysis; Neural networks] [N1105]

[N: **WARNING** [N1105]
Not complete pending the completion of a reclassification; see also
G05B23/02
]

G05B23/02S4M   . . . .   [N: model based detection method, e.g. first-principles knowledge model]
[N1105]

[N: **WARNING** [N1105]
Not complete pending the completion of a reclassification; see also
G05B23/02
]

G05B23/02S4M2   . . . . .   [N: based on a qualitative model, e.g. rule based; if-then decisions]
[N1105]

[N: **WARNING** [N1105]
Not complete pending the completion of a reclassification; see also
G05B23/02
]

G05B23/02S4M2A   . . . . . .   [N: Causal models, e.g. fault tree; digraphs; qualitative physics]
[N1105]

[N: **WARNING** [N1105]
Not complete pending the completion of a reclassification; see also
G05B23/02
]

G05B23/02S4M2B   . . . . . .   [N: Abstraction hierarchy, e.g. "complex systems" i.e. system is
divided in subsystems, subsystems are monitored and results are
combined to decide on status of whole system] [N1105]

[N: **WARNING** [N1105]
Not complete pending the completion of a reclassification; see also
G05B23/02
]

G05B23/02S4M4   . . . . .   [N: based on a quantitative model, e.g. mathematical relationships
between inputs and outputs; functions: observer, Kalman filter, residual
calculation, Neural Networks] [N1105]

[N: **WARNING** [N1105]
Not complete pending the completion of a reclassification; see also
G05B23/02
]

G05B23/02S4T   . . . .   [N: injecting test signals and analyzing monitored process response, e.g.
injecting the test signal while interrupting the normal operation of the
monitored system; superimposing the test signal onto a control signal during
normal operation of the monitored system] [N1105]

[N: **WARNING** [N1105]
Not complete pending the completion of a reclassification; see also
G05B23/02
]

G05B23/02S6   . . .   [N: characterized by the response to fault detection] [N1105]

[N: **WARNING** [N1105]
Not complete pending the completion of a reclassification; see also G05B23/02
]

G05B23/02S6C   .   .   .   .   [N: Confirmation of fault detection, e.g. extra checks to confirm that a failure has indeed occurred] [N1105]

[N: **WARNING** [N1105]
Not complete pending the completion of a reclassification; see also
G05B23/02
]

G05B23/02S6D   .   .   .   .   [N: Control of logging system, e.g. decision on which data to store; time-stamping measurements] [N1105]

[N: **WARNING** [N1105]
Not complete pending the completion of a reclassification; see also
G05B23/02
]

G05B23/02S6F   .   .   .   .   [N: Fault communication, e.g. human machine interface [HMI]] [N1105]

[N: **WARNING** [N1105]
Not complete pending the completion of a reclassification; see also
G05B23/02
]

G05B23/02S6F2   .   .   .   .   .   [N: Alarm generation, e.g. communication protocol; Forms of alarm] [N1105]

[N: **WARNING** [N1105]
Not complete pending the completion of a reclassification; see also
G05B23/02
]

G05B23/02S6F4   .   .   .   .   .   [N: Presentation of monitored results, e.g. selection of status reports to be displayed; Filtering information to the user] [N1105]

[N: **WARNING** [N1105]
Not complete pending the completion of a reclassification; see also
G05B23/02
]

G05B23/02S6J   .   .   .   .   [N: Fault isolation and identification, e.g. classify fault; estimate cause or root of failure] [N1105]

[N: **WARNING** [N1105]
Not complete pending the completion of a reclassification; see also
G05B23/02
]

G05B23/02S6J2   .   .   .   .   .   [N: Qualitative, e.g. if-then rules; Fuzzy logic; Lookup tables; Symptomatic search; FMEA] [N1105]

[N: **WARNING** [N1105]
Not complete pending the completion of a reclassification; see also
G05B23/02
]

G05B23/02S6J4   .   .   .   .   .   [N: Quantitative, e.g. mathematical distance; Clustering; Neural networks; Statistical analysis] [N1105]

[N: **WARNING** [N1105]
Not complete pending the completion of a reclassification; see also
G05B23/02
]

G05B23/02S6M   . . . .   [N: Predictive maintenance, e.g. involving the monitoring of a system and, based on the monitoring results, taking decisions on the maintenance schedule of the monitored system; Estimating remaining useful life [RUL] (preventive maintenance, i.e. planning maintenance according to the available resources without monitoring the system G06Q10/00C)] [N1105]

[N: **WARNING** [N1105]
Not complete pending the completion of a reclassification; see also G05B23/02
]

G05B23/02S6P   . . . .   [N: Modifications to the monitored process, e.g. stopping operation or adapting control] [N1105]

[N: **WARNING** [N1105]
Not complete pending the completion of a reclassification; see also G05B23/02
]

G05B23/02S6P2   . . . . .   [N: Reconfiguration to prevent failure, e.g. usually as a reaction to incipient failure detection] [N1105]

[N: **WARNING** [N1105]
Not complete pending the completion of a reclassification; see also G05B23/02
]

G05B23/02S6P4   . . . . .   [N: Switching into safety or degraded mode, e.g. protection and supervision after failure] [N1105]

[N: **WARNING** [N1105]
Not complete pending the completion of a reclassification; see also G05B23/02
]

G05B23/02S6P6   . . . . .   [N: Optimizing process, e.g. process efficiency, product quality] [N1105]

[N: **WARNING** [N1105]
Not complete pending the completion of a reclassification; see also G05B23/02
]

G05B23/02S6R   . . . .   [N: Reconfiguration of monitoring system, e.g. use of virtual sensors; change monitoring method as a response to monitoring results] [N1105]

[N: **WARNING** [N1105]
Not complete pending the completion of a reclassification; see also G05B23/02
]

G05B24/00   **Open-loop automatic control systems not otherwise provided for**

G05B24/02   . electric

G05B24/04   . fluidic

G05B99/00   **Subject matter not provided for in other groups of this subclass** [N0704]