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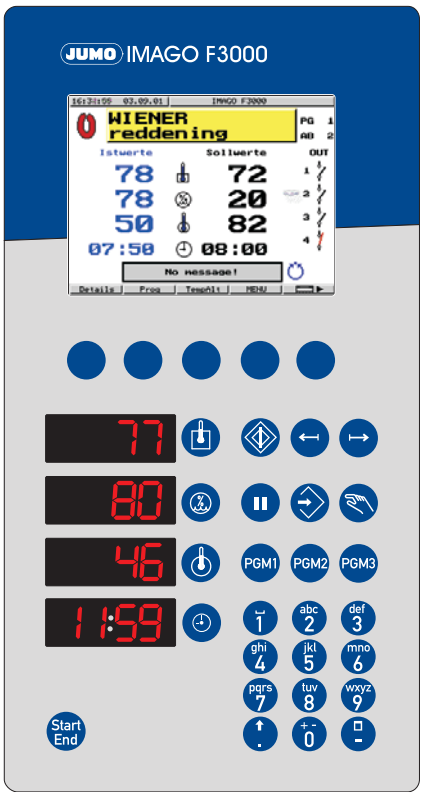
JUMO IMAGO F3000
Process controllers for the meat processing industry

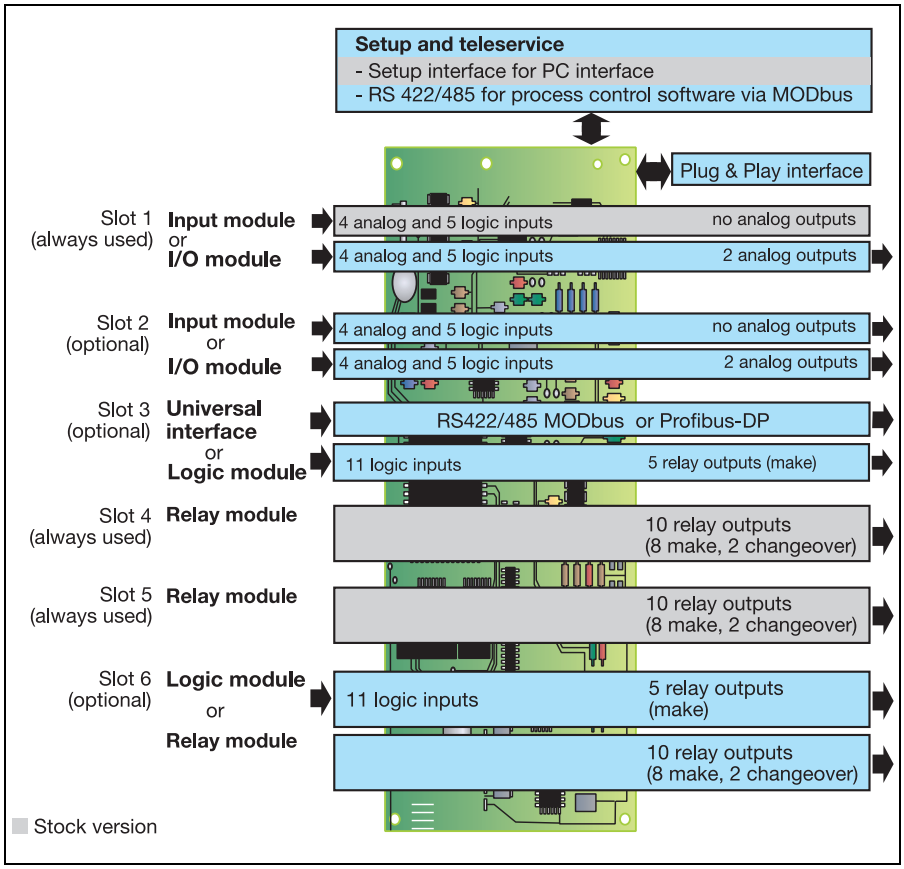


Type 700101/1...

Brief description

These process controllers are built to a modular design, and are suitable for the control and regulation of cooking, smoking and climate-control installations, and all associated equipment such as smoke generators, catalyzers etc. They are available in both upright (portrait) and horizontal (landscape) formats.
The unit has a 5" color display capable of showing 27 colors. Templates for the user interface can be individually adjusted and laid out by the users themselves. Texts, process values, background diagrams and icons can be arranged as required. A status line indicates the last alarm that occured. LED displays have also been included, so that the most important process variables are visible from a distance. Individual keys can be assigned to special functions and labelled accordingly.
The instrument can store up to 99 named profile programs of up to 99 segments. All the processes required in the system are defined in 99 process steps and then simply called up sequentially for the program entry. An optional Plug & Play memory is available that can store all the data from the instrument, thus enabling easy exchange of hardware without any problems caused by lost data. The “Teleservice” software makes is possible to carry out configuration from a remote location, via a modem and the telephone network, thus saving on-site service costs.
A communication interface for MODbus or Profibus-DP facilitates integrating the instrument into a network.

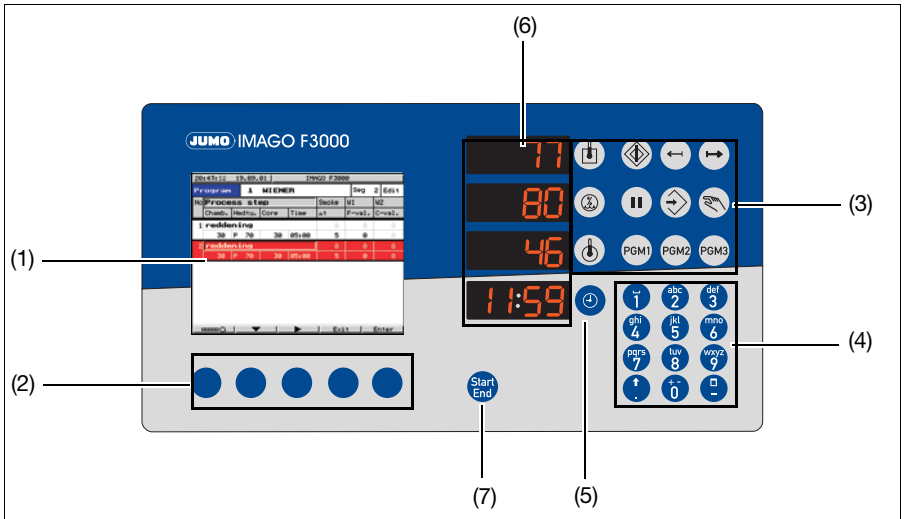
Block structure



Key features

- Two screen layout templates (masks) for automatic operation and one for the basic status, all freely editable
- 5" color display, 12mm LED displays for process values
- Plug & Play memory, to back up configuration data, transfer programs from one instrument to another, and to read in instrument software
- Configuration and parameter levels in English, German, French
- Math and logic functions
- Teleservice via modem
- Setup program for Windows 95/98/NT4.0/2000/ME/XP
- Program editor

Display and control elements



(1)	Color screen	(5)	Key for time entry
(2)	Softkeys in the color screen, with variable meanings	(6)	4 LED displays The top three can be configured in the setup program
(3)	Freely assignable function keys	(7)	Start/Stop button for program start and program stop
(4)	Keypad for numerical/text entry		

Programs

99 profile programs can be entered, stored, and changed at any time. They are made up of various process steps with the associated setpoint values. A program can have a maximum of 99 segments. A total of 3000 segments can be stored for all programs together. The programs are chosen from a list or selected by meaningful icons.

Segments

A segment consists of a process step, up to 9 setpoint values, and the segment time. Various conditions for moving to the next step control the segment sequence.

Process steps

A process step contains various pre-defined systems states for smoking, reddening etc., which are usually specified by the system manufacturer.
The user only has to select the process and enter the appropriate setpoints. Up to 99 process steps can be stored.

Step-on conditions

The system steps on to the next segments when...
... the segment time has elapsed
... the programmed core temperature has been reached
... the segment time has elapsed and/or the programmed core temperature has been reached.
... the programmed final F value has been reached.
... the programmed final C value has been reached.
... a logic input that was configured as a condition for stepping on has been activated.
... the programmed final F value and the programmed core temperature have been reached.

Cooking process

The process can be controlled by the delta cooking or F-value cooking methods.

Signal for end of program

This is provided by a relay output.

Operating functions

18 of the total of 36 operating outputs can have a switching response assigned. They can be configured for ON-advance, OFF-advance, ON-delay or OFF-delay with respect to the changeover point from one segment to another. A pulse/pause ratio can also be selected. All times can be set individually.

2 timers

After entering an operating time for the system, a counter runs and the system has to be enabled by a password. A second counter can, for instance, be used to monitor and signal cleaning intervals.

Math and logic functions

The math module makes it possible to include setpoints, output levels, analog input measurements and the like in a mathematical formula.
The logic module can be used to create a logical combination of such variables as logic inputs, limit comparators and operating outputs.
A maximum of 4 math functions and 8 logic combinations can be entered via the setup program, and the results of these functions can be delivered at the outputs or used internally.
All logic formulae are processed and become effective within 100ms.

Self-optimization

Standard features include self-optimization, making it possible for a user to adapt the controller to match the control loop without any knowledge of control systems engineering.
This feature tests and evaluates the response of the control loop to specific changes in the control input parameters. The control parameters Xp, Tn, Tv and Cy are calculated.

PC programs

■ **Setup program**
The setup program for configuring the instrument can be installed in English, German or French. A PC can be used to create sets of data, edit them, transfer them to the process controls, or read them out from the instrument. The sets of data are stored and managed. 3 process layouts can be freely configured.

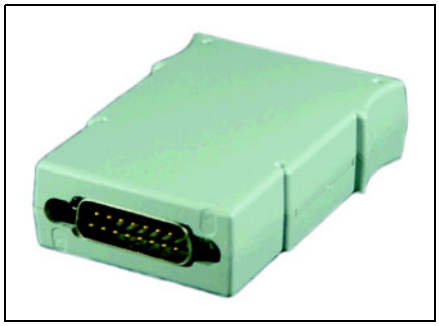
■ **Teleservice**
- Remote configuration and diagnosis of the system via modem
- Establish a connection through the setup program, dialling by:
  a) direct-dialling through the setup, or
  b) callback
- Display system status, such as operating modes, logic inputs and outputs, alarms and system information.

■ **Process steps**
Process steps are defined through the setup program and transferred to the instrument. The program editor is used to compile the programs.

RS422/RS485 interface (option)

The serial interface is used for communication with higher-level (supervisory) systems, and includes electrical isolation.
The transmission protocols used are MODbus and Profibus.

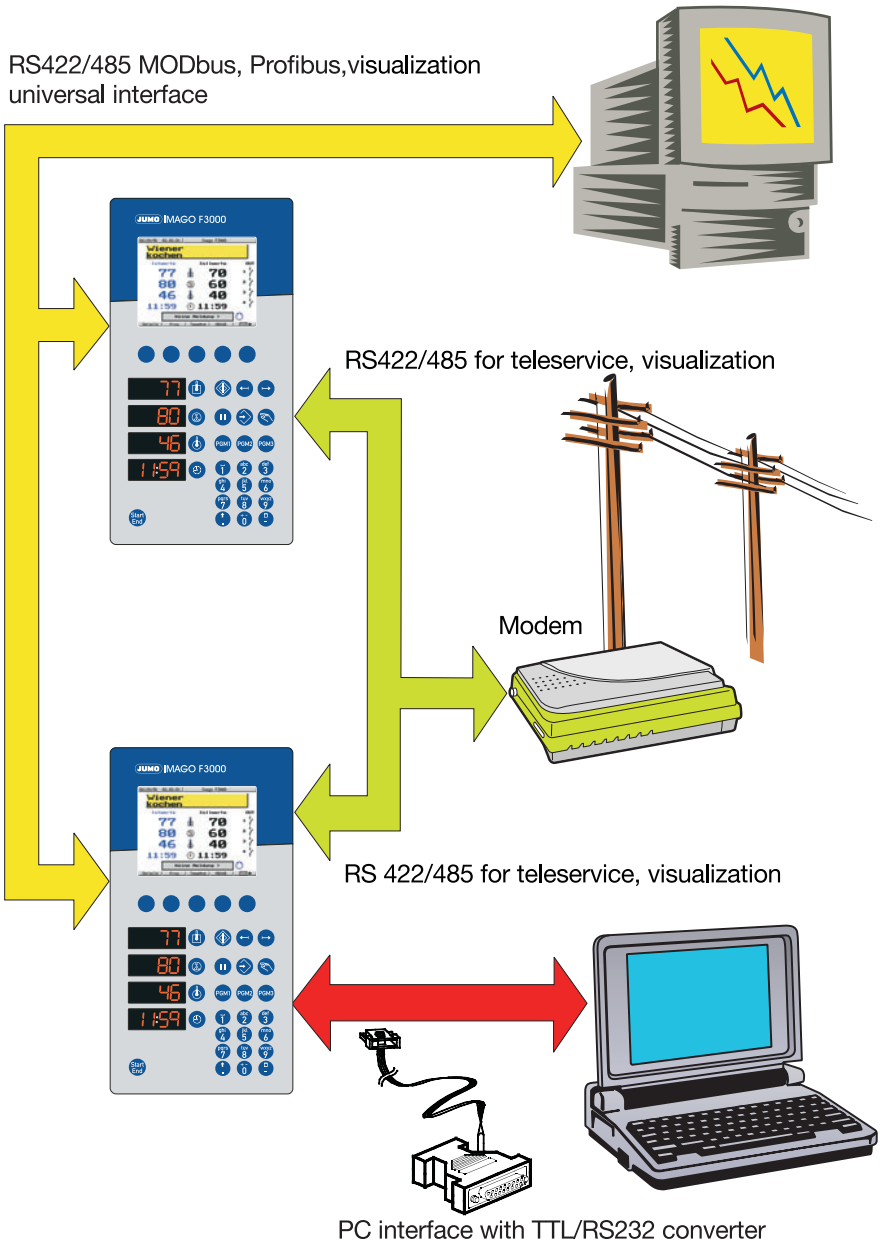
Plug & Play memory (option)



This is plugged into the back of the instrument, and can store all the instrument data, or a selection:
- parameter and configuration data
- process steps
- user programs
- instrument software version

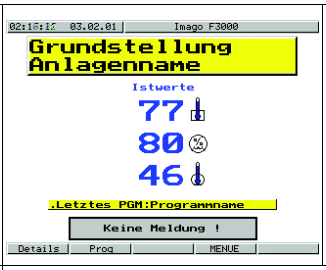
Practical applications are for:
- simple configuration after a hardware replacement
- reading in new setup data from the system manufacturer
- copying user programs
- reading in new applications programs from the manufacturer
- reading in new instrument software

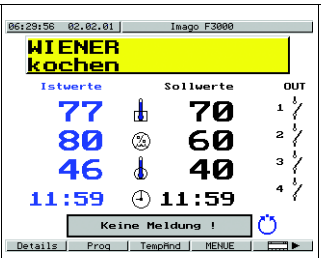
Interfaces for teleservice, setup and visualization

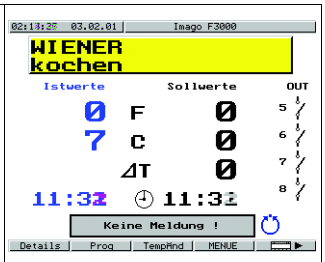


Extract from the parameter level

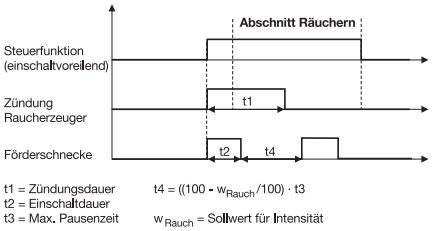
Screen layout
Three freely editable screens (for basic status, Automatic 1 and Automatic 2) are created in the setup program and then transferred to the instrument.



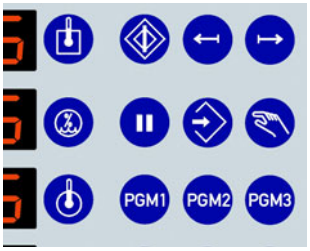




Smoke generator
The smoke generator is activated by an operating function. The smoke intensity can be altered while the profile program is running.

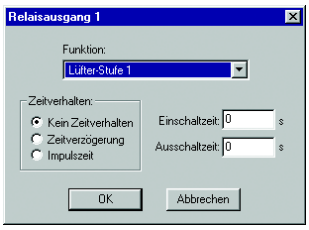


Function keys
The instrument is supplied as standard with the function keys printed as shown on the right.
Replaceable inserted strips can be used to provide other legends and functions.

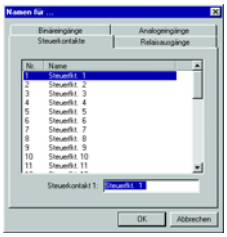


Assignment of the relay outputs

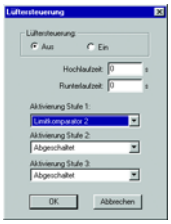
Each relay output can be assigned to an instrument function, a time event or an input/output switching action.



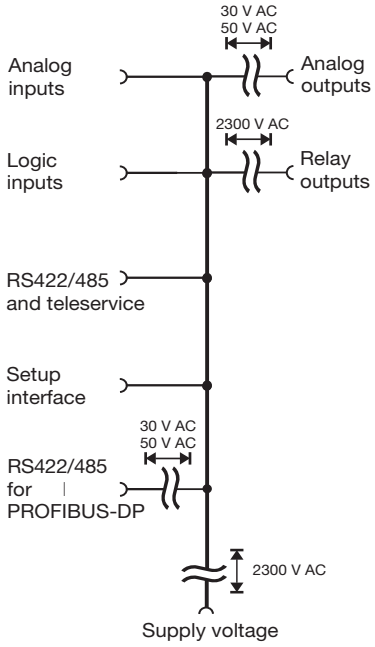
Texts and names can be defined for:
analog and logic inputs,
operating contacts,
relay outputs, process steps, programs, other languages.



Fan control
The fan power stages can be switched on by various logic signals within the instrument, such as a limit comparator.



Electrical isolation



Technical data

Analog inputs (max. two I/O modules, each with 4 inputs)

Thermocouples	Range	Meas. accuracy	Ambient temperature error
Fe-Con L	-200 to + 900°C	≤0.4%	100 ppm/°C
Fe-Con J EN 60584	-200 to +1200°C	≤0.4%	100 ppm/°C
NiCr-Ni K EN 60584	-200 to +1372°C	≤0.4%	100 ppm/°C
Cold junction	internal Pt100		

Resistance thermometer	Connection type	Range	Meas. accuracy	Ambient temperature error
Pt100 EN 60751	3-wire	-200 to +850°C	≤0.1%	100 ppm/°C
Sensor lead resistance	max. 30Ω per conductor in 2-wire/3-wire circuit			
Measuring current	250µA			
Lead compensation	Not required for 3-wire circuit. For a 2-wire circuit, lead compensation can be provided in the software by a process value correction.			

Standard signals	Range	Meas. accuracy	Ambient temperature error
Voltage	0 — 1V, input resistance R_E > 100kΩ 0 — 10V, input resistance R_E > 100kΩ	≤0.1% ≤0.1%	100 ppm/°C 100 ppm/°C
Current	0 — 20mA, voltage drop ≤ 1V 4 — 20mA, voltage drop ≤ 1V	≤0.1% ≤0.1%	100 ppm/°C 100 ppm/°C
Scaling	through software		

Measurement circuit monitoring[1]	Over/underrange	Probe/lead short-circuit[1]	Probe/lead break
Thermocouple	•	-	•
Resistance thermometer	•	•	•
Voltage 0 — 1V	•	-	-
0 — 10V	•	-	-
Current 0 — 20mA	•	-	-
4 — 20mA	•	•	•

• = recognized - = not recognized

1. In the event of an error, the ouptuts move to defined levels (configurable as: 0%, 100%, -100%).

Logic inputs (max. 2 I/O modules, each with 5 inputs, and max. 2 logic modules, each with 11 inputs)

Floating contacts	with common reference potential, configurable for PLC level through internal solder links
PLC level	low = 0 to 6V, high = 13 to 30V

Relay outputs (max. 3 relay modules, each with 10 outputs, and max. 2 logic modules, each with 5 outputs)

Relay (relay module)	2 changeover contacts, 8 make contacts
Relay (logic modules)	5 make contacts
– contact rating	3A at 250VAC, resistive load
– contact life	10^6 operations at rated load between pole and make/break contact
– contact protection circuit	Varistor S14K300

Analog outputs (max. 1 I/O module with two outputs)

Voltage – output signals – load resistance	0 — 10V / 2 — 10V, can be changed over in software R_{load} ≥ 500 Ω
Current – outputs signals – load resistance	0 — 20mA / 4 — 20mA, can be changed over in software R_{load} ≤ 450 Ω

Controller

Number	four
Controller type	single-setpoint controller, double-setpoint controller, modulating controller, proportional controller, proportional controller with integrated actuator driver
Controller structures	P/PD/PI/PID/I
A/D converter	resolution better than 14 bit
D/A converter	13 bit
Sampling time	500 ms
Sampling time for logic formulae, with read-in and output of the signals	100 ms

Color display

Resolution	320 x 240 pixels
Size	5"
Number of colors	27 colors

Electrical data

Supply voltage (switchmode power supply)	110 — 240 V AC -15/+10 %, 48 — 63 Hz 20 — 30 V AC/DC, 48 — 63 Hz
Test voltage (type test)	as per EN 61 010, Part 1 overvoltage category II, pollution degree 2
Power consumption	max. 44 VA, p.f. ≤ 0.7
Data backup	EEPROM
Electrical connection	at rear by screw terminals, conductor cross-section up to 2.5 mm^2 and ferrules (length: 10 mm)
Electromagnetic compatibility - interference emission - interference immunity	to EN 61 326 Class B to industrial requirements
Safety standards	to EN 61 730-1 or EN 61 010-1

Housing

Housing type	plastic housing for panel mounting (indoor use) according to IEC 61554	
Dimensions in mm (for type ...)	700101/1, ...	700101/2, ...
Bezel	307 x 165 (portrait)	165 x 307 (landscape)
Mounting depth	107.6	107.6
Panel cut-out	138_0^{+1} x $282_0^{+1.3}$	282_0^{+1} x $138_0^{+1.3}$
Ambient/storage temperature range	0 to +50 °C / -40 to +70 °C	
Climatic conditions	rel. humidity not exceeding 95 % annual mean, no condensation	
Site altitude	up to 2000 m above sea level	
Operating position	any	
Protection	to EN 60 529, front IP 67, rear IP 20	
Weight of minimal version (fully fitted)	approx. 1900 g (2300 g)	
Membrane keypad	Polyester membrane, protection: IP 67 resistant to normal cleaning agents and detergents	
Keys	Short-stroke keys with tactile feedback (click effect)	

Setup interface (electrically isolated)

Interface type	RS422/RS485
Protocol	always MODbus
Baud rate	**9600**, 19200, 38400
Device address	**1** — 255
Minimum response time	0 — **500** ms

Universal interface

MODbus

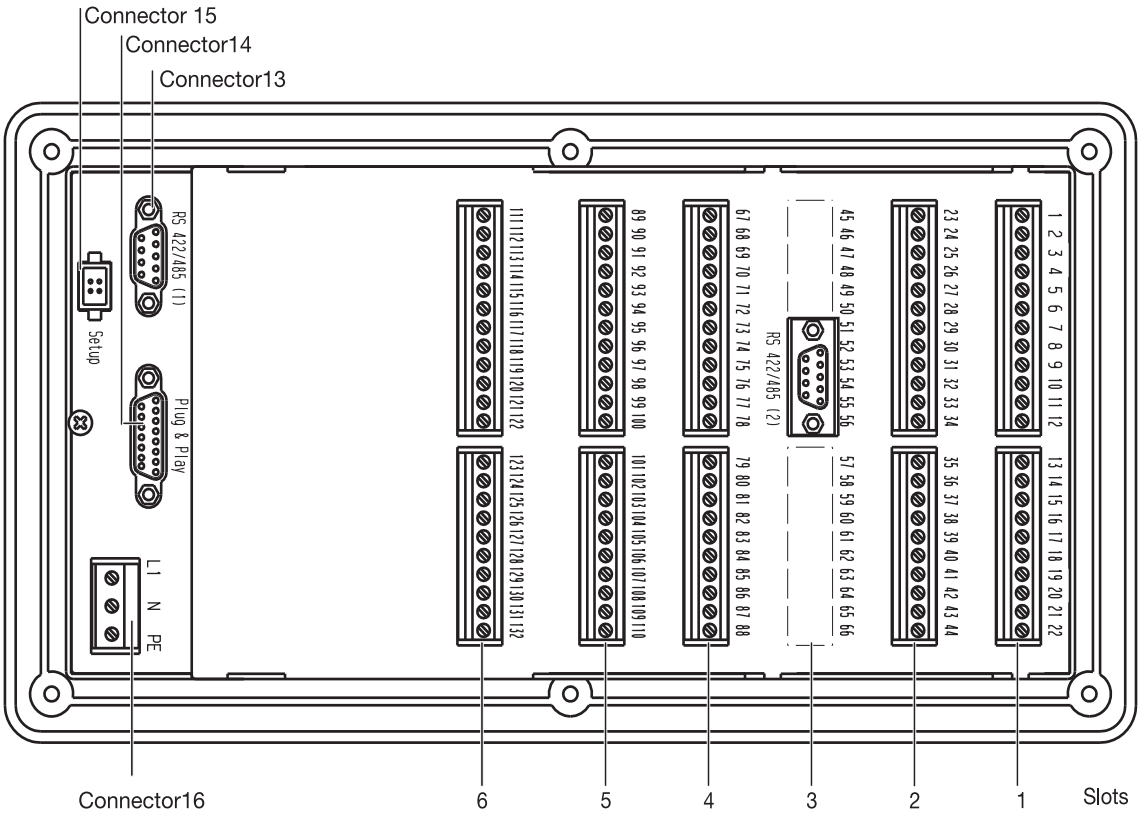
Interface type	RS422/RS485
Protocol	MODbus
Baud rate	**9600**, 19200, 38400
Device address	**1** — 255
Minimum response time	0 — **500** ms

Profibus

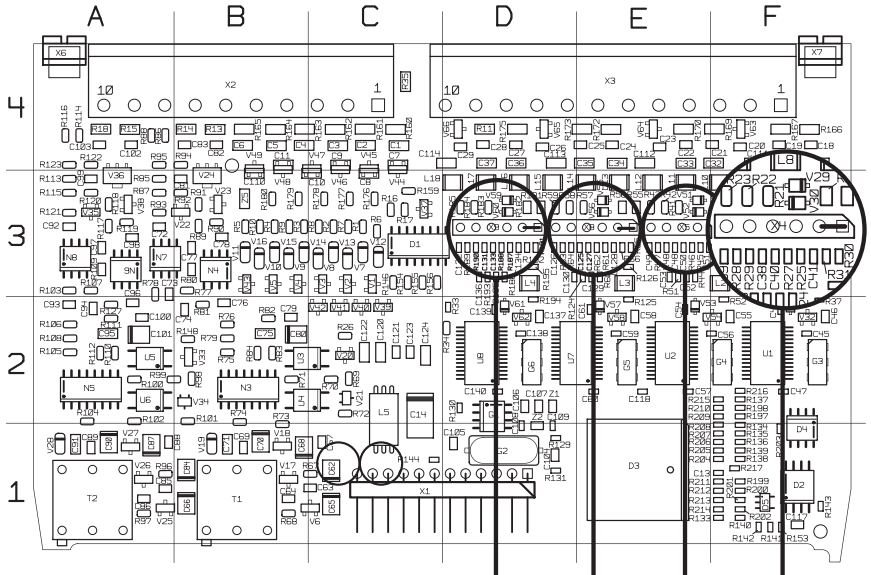
Device address	**1** — 255

bold print = factory setting

Connection diagram



Note: the link positions must be altered for voltage or thermocouple inputs!



Analog input No. 4 3 2 1

Pt100 (factory setting)

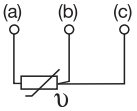
Your setting:

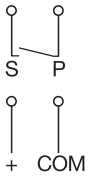
Setting options:
Only **one** link to be plugged in for each anaog input !

	Pt100
	0 — 10V
	0 — 1V and thermocouple

The current signal measurement does not depend on the position of the link !

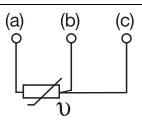
I/O module (in slot 1)

	Analog input No.	1	2	3	4	Symbol
	Thermocouple	1 + 3 -	4 + 6 -	7 + 9 -	10 + 12 -	
	Resistance thermometer	1 (a) 2 (b) 3 (c)	4 (a) 5 (b) 6 (c)	7 (a) 8 (b) 9 (c)	10(a) 11(b) 12(c)	
	Current input 0(4) — 20mA	2 + 3-	5+ 6 -	8 + 9 -	11 + 12 -	
	Voltage 0(2) — 10V	1 + 3 -	4 + 6 -	7 + 9 -	10 + 12 -	
The analog inputs 1 and 2, 3 and 4, must be electrically isolated from one another!						

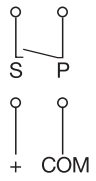
	Logic input No.	1	2	3	4	5	Symbol
	floating contact or PLC input: 24V DC LO level: 0 to 6V HI level: 13 to 30V	13 S (n.o. make) 18 P (common) 13 + 18 COM	14 S 18 P 14 + 18 COM	15 S 18 P 15 + 18 COM	16 S 18 P 16 + 18 COM	17 S 18 P 17 + 18 COM	
If PLC inputs are used, then the supply voltage for the logic inputs must be electrically isolated from the analog inputs!							

	Analog output No.	1	2	Symbol
	0(4) — 20mA 0(2) — 10V configurable	19 + 20 -	21 + 22 -	

I/O module (in slot 2)

Analog input No.	5	6	7	8	Symbol
Thermocouple	23 + 25 -	26 + 28 -	29 + 31 -	32 + 34 -	
Resistance thermometer	23(a) 24(b) 25(c)	26(a) 27(b) 28(c)	29(a) 30(b) 31(c)	32(a) 33(b) 34(c)	
Current input 0(4) — 20mA	24 + 25-	27 + 28 -	30 + 31 -	33 + 34 -	
Voltage 0(2) — 10V	23 + 25 -	26 + 28 -	29 + 31 -	32 + 34 -	

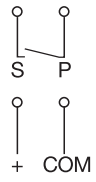
The analog inputs 5 and 6, 7 and 8, must be electrically isolated from one another!

Logic input No.	6	7	8	9	10	Symbol
floating contact or PLC input: 24V DC LO level: 0 to 6V HI level: 13 to 30V	35 S 40 P 35 + 40 COM	36 S 40 P 36 + 40 COM	37 S 40 P 37 + 40 COM	38 S 40 P 38 + 40 COM	39 S 40 P 39 + 40 COM	

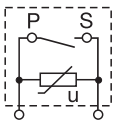
If PLC inputs are used, then the supply voltage for the logic inputs must be electrically isolated from the analog inputs!

Analog output No.	3	4	Symbol
0(4) — 20mA 0(2) — 10V (configurable)	41 + 42 -	43 + 44 -	

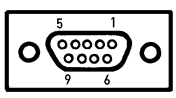
Logic module (in slot 3)

Logic input No.	22	23	24	25	26	27	28	29	30	31	32	Symbol
floating contact or PLC input: 24V DC LO level: 0 to 6V HI level: 13 to 30V	45 S 56 P 45 + 56 COM	46 S 56 P 46 + 56 COM	47 S 56 P 47 + 56 COM	48 S 56 P 48 + 56 COM	49 S 56 P 49 + 56 COM	50 S 56 P 50 + 56 COM	51 S 56 P 51 + 56 COM	52 S 56 P 52 + 56 COM	53 S 56 P 53 + 56 COM	54 S 56 P 54 + 56 COM	55 S 56 P 55 + 56 COM	

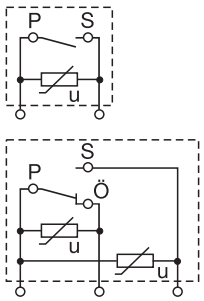
If PLC inputs are used, then the supply voltage for the logic inputs must be electrically isolated from the analog inputs!

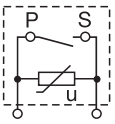
Relay output No.	31	32	33	34	35	Symbol
3A 230V	57 P 58 S	59 P 60 S	61 P 62 S	63 P 64 S	65 P 66 S	

Universal interface (in slot 3)

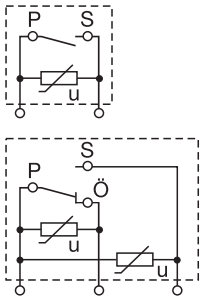
Connection for	Assignment	PROFIBUS-DP	Symbol
RS422 interface, electrically isolated	4 RxD (+) 9 RxD (-) 3 TxD (+) 8 TxD (-) 5 GND	8 A(+) 3 B(-) 6 VCC 5 GND 9 GND	
RS485 interface, electrically isolated	3 RxD/TxD A(+) 8 RxD/TxD B(-) 5 GND		

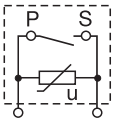
Relay module (in slot 4)

Relay output No.	1	2	3	4	5	Symbol
3A 230V	67 P 68 O 69 S	70 P 71 O 72 S	73 P 74 S	75 P 76 S	77 P 78 S	

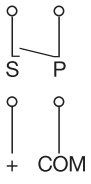
Relay output No.	6	7	8	9	10	Symbol
3A 230V	79 P 80 S	81 P 82 S	83 P 84 S	85 P 86 S	87 P 88 S	

Relay module (in slot 5)

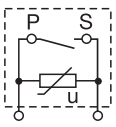
Relay output No.	11	12	13	14	15	Symbol
3A 230VA	89 P 90 O 91 S	92 P 93 O 94 S	95 P 96 S	97 P 98 S	99 P 100 S	

Relay output No.	16	17	18	19	20	Symbol
3A 230V	101 P 102 S	103 P 104 S	105 P 106 S	107 P 108 S	109 P 110 S	

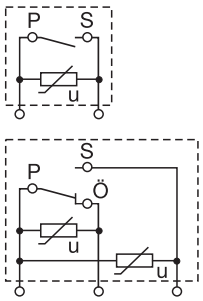
Logic module (in slot 6)

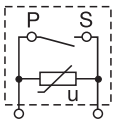
Logic input No.	11	12	13	14	15	16	17	18	19	20	21	Symbol
floating contact or PLC input: 24V DC LO level: 0 to 6V HI level: 13 to 30V	111 S 122 P 111 + 122 COM	112 S 122 P 112 + 122 COM	113 S 122 P 113 + 122 COM	114 S 122 P 114 + 122 COM	115 S 122 P 115 + 122 COM	116 S 122 P 116 + 122 COM	117 S 122 P 117 + 122 COM	118 S 122 P 118 + 122 COM	119 S 122 P 119 + 122 COM	120 S 122 P 120 + 122 COM	121 S 122 P 121 + 122 COM	

If PLC inputs are used, then the supply voltage for the logic inputs must be electrically isolated from the analog inputs!

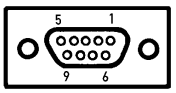
Relay output No.	26	27	28	29	30	Symbol
3A 230V	123 P 124 S	125 P 126 S	127 P 128 S	129 P 130 S	131 P 132 S	

Relay module (in slot 6)

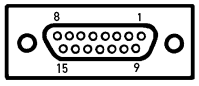
Relay output No.	21	22	23	24	25	Symbol
3A 230VA	111 P 112 O 113 S	114 P 115 O 116 S	117 P 118 S	119 P 120 S	121 P 122 S	

Relay output No.	26	27	28	29	30	Symbol
3A 230V	123 P 124 S	125 P 126 S	127 P 128 S	129 P 130 S	131 P 132 S	

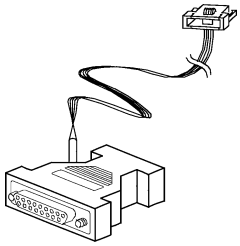
Connector 13

Teleservice, visualization	RS422	RS485	Symbol
RS422/485 interface	4 RxD (+) 9 RxD (-) 3 TxD (+) 8 TxD (-)	8 RxD/TxD B(-) 3 RxD/TxD A(+)	
	5 GND	5 GND	

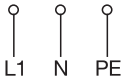
Connector 14

Connection for	Assignment	Symbol
Plug & Play interface		

Connector 15

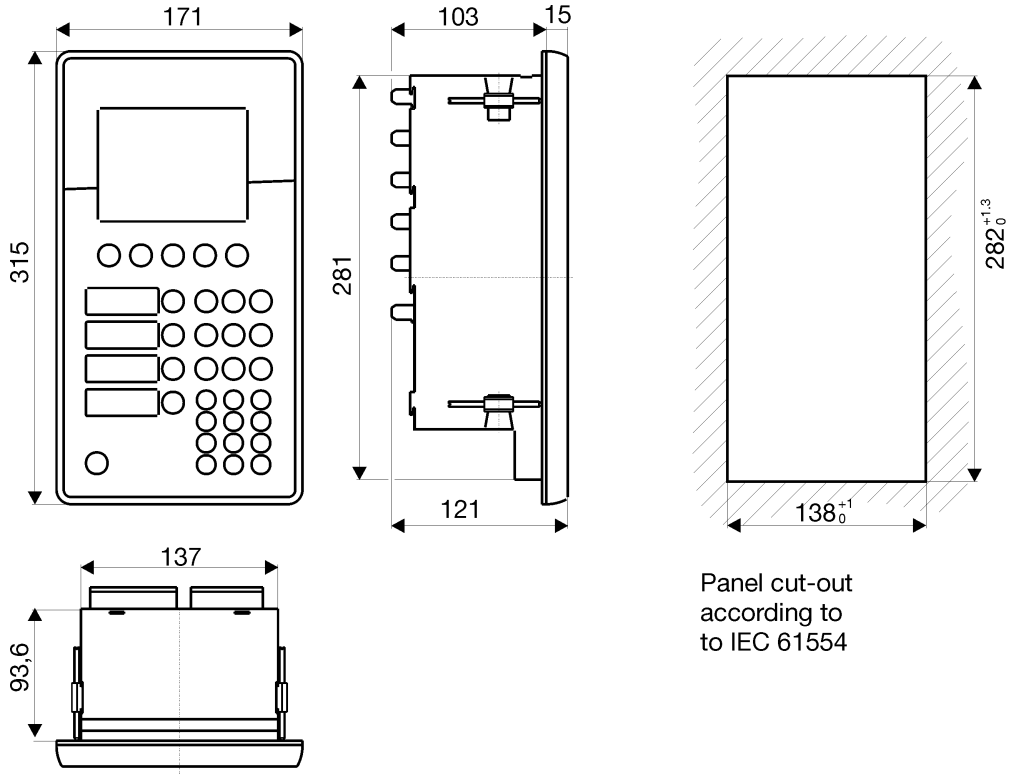
Connection for	Assignment	Symbol
Setup connector	PC interface with TTL/RS232 converter  (This is not electrically isolated from the analog inputs, logic inputs, and the teleservice interface.)	

Connector 16

Connection for	Assignment	Symbol
Supply voltage, as per nameplate	L1 phase/line N neutral PE protective earth	

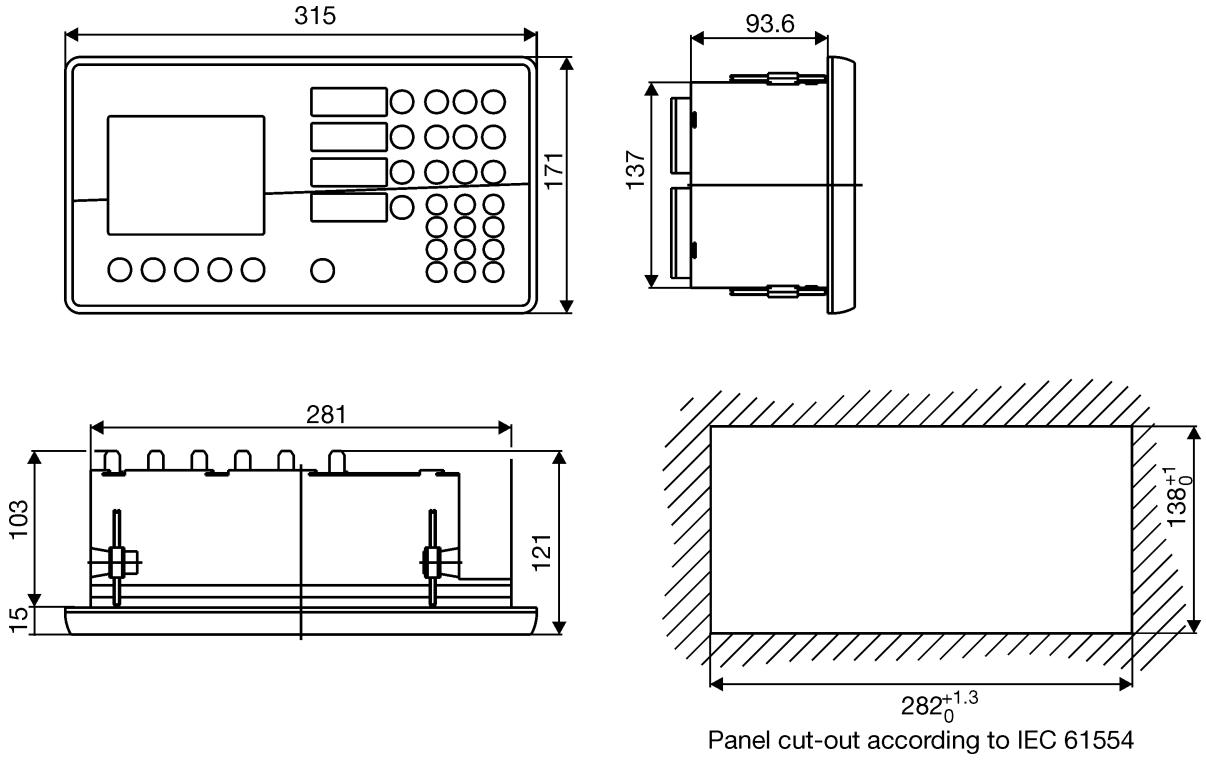
Dimensions

Type 700101/1, ... portrait format



Panel cut-out
according to
to IEC 61554

Type 700101/2, ... landscape format



Panel cut-out according to IEC 61554

Order details: JUMO IMAGO F3000 process controlles for the meat processing industry

(1) Basic type

700101 JUMO IMAGO F3000

(2) Basic type extensions

Format

x 1 332mm x 165mm, portrait format
x 2 165mm x 332mm, landscape format

Version

x 8 standard, with factory settings
x 9 customized programming according to specification

Language for the configuration level

x 1 German
x 2 English
x 3 French
x 5 Russian

(3) Slot assignments

Code	Plug-in cards for inputs, outputs and interfaces	Slot Number 1	2	3	4	5	6
0	not used	-	0	0	-	0	0
1	relay module: 10 relay outputs (8 make, 2 changeover)	-	-	-	1	X	X
2	input module: 4 analog inputs, 5 logic inputs for floating contacts	2	X	-	-	-	-
3	I/O module: 4 analog inputs, 5 logic inputs for floating contacts, 2 analog outputs	X	X	-	-	-	-
4	logic module: 11 logic inputs for floating contacts, 5 relay outputs (make)	-	-	X	-	-	X
5	universal interface MODbus (electrically isolated)	-	-	X	-	-	-
6	universal interface PROFIBUS-DP (electrically isolated)	-	-	X	-	-	-
7	I/O module: 4 analog inputs, 5 logic inputs for PLC level	X	X	-	-	-	-
8	I/O module: 4 analog inputs, 5 logic inputs for PLC level, 2 analog outputs	X	X	-	-	-	-
9	Logic module: 11 logic inputs for PLC level, 5 relay outputs (make)	-	-	X	-	-	-

- assignment not possible
X assignment possible
■ factory-set

(4) Supply voltage

x 2 3 110 — 240V AC, -15/+10%, 48 — 63Hz
x 2 5 20 — 53V AC/DC, 48 — 63Hz

(5) Interface for teleservice and visualization

x 0 0 no interface
x 5 4 RS422/485 interface (MODbus slave, connector 13)

(6) Extra code

x 0 0 0 no extra code
x 2 1 1 Plug & Play memory
x 2 1 3 recording function

(7) Approvals

x 0 0 0 none
x 0 6 1 Underwriters Laboratories Inc. (UL)

	(1)		(2)		(3)		(4)		(5)		(6)		(7)
Order code		/		-		-		-		/		-	
Order example	700101	/	181	-	200110	-	23	-	00	/	000	-	000

Plug-in cards for retrofitting/converting

	Sales No.
Available from stock:	
Relay module: 10 relay outputs (8 make, 2 changeover)	70/00398349
Input module: 4 analog inputs, 5 logic inputs	70/00398351
I/O module: 4 analog inputs, 5 logic inputs, 2 analog outputs	70/00398352
Logic module: 11 logic inputs, 5 relay outputs (make)	70/00398350
Interface for teleservice and visualization, RS422/485 (connector 13, MODbus slave, Code 54)	70/00398353
Delivery time approx. 2 weeks:	
Universal interface MODbus (slot 3)	70/00411250
Universal interface for PROFIBUS-DP (slot 3)	70/00411248
Input module for PLC level	70/00433065
Logic module for PLC level	70/00433064

Accessories - Price Sheet 70.9770

	Sales No.
Program editor, multilingual	70/00398294
Setup program and program editor, multilingual	70/00398296
Setup program, program editor and teleservice, multilingual	70/00398297
PC interface with TTL / RS232 converter (socket)	70/00301315
Interface converter RS232 to RS422	70/00376969
Plug-in power supply for interface converter	70/00365933

Accessories

	Sales No.
Plug & Play memory	70/00398298
Enable recording function	70/00433789
Mounting brackets for installation in LPF-200 / MPF-88 front panel cut-out	70/00413524