Product Description

The Serie GR3xx provides our smallest and most economical programmable controllers. Their characteristics make them ideal solutions for medium and small application, including control task in machines and process that involves position and analogue interface. The I/O options provide great flexibility and can be expand with up to 56 I/O points.

The GR3xx micro controller has the maximum main features:

- 14 Digital inputs – 24 Vdc
- 8 Transistor outputs
- 2 Relay outputs
- 4 Analogue inputs – 0 to 10 Vdc, 2 of them support thermocouple type J or K
- 2 Analogue outputs – 0 to 10 Vdc
- 2 High speed outputs with frequency up to 20KHz
- 1 High speed counter, 24 bits resolution, up/down, up to 20 KHz, 12 operation modes that allows the use of transducers and position encoders
- Interruption input
- HardFlex ® architecture – extremely flexible architecture that allows reprogramming of high-speed hardware functions
- Set points keyboard
- Expand with up to 1 I/O module
- Native Modbus RTU protocol (slave)
- LEDs indicators show I/O status
- Automatic addressing to expand modules
- On line programming
- PID Algorithm
- Real Time Clock Module
- Retentive bit memory without battery necessity
- Great memory capacity with high performance
- Serial communication port includes Modbus or Alnet I protocols
- Diagnostic information available on runtime software and application program
- Identification cards to I/O signals
- Mounted on DIN TS35 rail

HARDFLEX Architecture ® : a characteristic that allows reprogramming of high speed hardware functions. It is ideal to solve complex and time critical process on machines and great speed applications. Altus can provide library functions and, under consulting, develop new library functions. These functions not only can be used to execute specific applications with counters and high speed outputs, but also logical I/O operations. For further information see HardFlex Technical Characteristics documentation.

Ordering Information

Included Items

The product packing comes with:
- Micro Controller
- Installation Guide

Product Code

Use the following codes when ordering the product:

Code	Description
GR310	6DI 4DO Micro Controller
GR316	10DI 6DO Micro Controller
GR330	14DI 10DO Micro Controller
GR350	14DI 12DO Counter Micro Controller
GR351	14DI 12DO Counter Expansion Micro Controller
GR370	14DI 12DO 4AI 2AO Thermocouple Counter Micro Controller
GR371	14DI 12DO 4AI 2AO Thermocouple Counter Expansion Micro Controller

Related Products

Depending on your system requirements, the following products might be ordered along with the GR3xx.

Code	Description
AL-1714	RJ45-RJ45 Cable
AL-1715	RJ45-CFDB9 Cable
AL-1718	RJ45-CMDB9 Cable
AL-1719	RJ45-CMDB9 Cable
AL-1720	RJ45-CMDB9 Cable
AL-1721	RJ45-CMDB25 Cable
AL 1726	RJ45-CFDB9 Cable
AL 1413	RS232 / RS485 Transceiver
AL 1518	24 Vdc/ 5 A Power Supply
GR380	Real Time Module
GR381	Expansion Cable
GR900	HardFlex, 1 fast counter 2 frequency outputs
GR901	HardFlex, 1 fast counter 1 PTO output
GR902	HardFlex, 1 fast counter 1 PWM output
PO9901	WebGate Plus
PO8522	Block rail TS35
PO8523	Spring Terminal Tool
FT1	Operator Panel
FT3	Operator Panel
FT5	Operator Panel
FT10	Operator Panel
QK1500	TS32/35
MT4100	MasterTool Programming Software

Notes:

AL-1714: Cable to connect a serial communication interface (Modbus or Alnet I, peer to peer) to CPU from Serie Ponto, Piccolo or Grano. Assembled with two RJ45 male connectors.

AL-1715: Cable assembled with one RJ45 serial connector and one RS232 9-pin male sub-D connector IBM/PC standard. It is used on COM1 to connect the following equipment:
- IHMs, which uses IBM/PC standard connector, to local supervision process
- IBM/PC standard microcomputer to supervision software.
- IBM/PC standard microcomputer to UCP programming port, through MasterTool Software

AL-1718: Cable assembled with one RJ45 serial connector and one RS232 9-pin male sub-D connector Altus standard. It is used on COM1 to connect the following equipment:
- AL-1413 module, RS232 / RS485 Transceiver

AL-1719: Cable assembled with one RJ45 serial connector and one RS232 9-pin male sub-D connector Altus standard. It is used on COM1 to connect the following equipment:

- IHM Foton 5 or Foton 10

AL-1720: Cable assembled with one RJ45 serial connector and one RS232 9-pin male sub-D connector Altus standard. It is used on COM1 to connect the following equipment:

- IHM Foton 1 or Foton 3

AL-1721: Cable assembled with one RJ45 serial connector and one RS232 9-pin male sub-D connector Altus standard. It is used on COM1 to connect the following equipment:

- Modem

AL-1726: Cable assembled with one RJ45 serial connector and one RS232 9-pin female sub-D connector IBM/PC standard. It is used on COM1 to connect the following equipment:

- PO9900 Webgate or PO9901 Webgate Plus

GR380: Real time clock module, which can be used with the micro controller GR350, GR351, GR370 e GR371

GR381: Cable assembled with two female connectors to connected expansion modules.

GR900: HardFlex characteristic that allows the use of fast counter application on micro controller GR350, GR351, GR370 e GR371.

GR901: HARDFLEX characteristic that allows the use of fast counter application and fast pulse output. It includes the option of acceleration and deceleration ramp to motion control applications.

GR902: HardFlex characteristic that allows the use of fast counter application and fast PWM output. It includes the option of acceleration and deceleration ramp to motion control applications.

PO9901: It allows the connection of Altus CPs on Ethernet TCP/IP net.

FT1 / FT3, FT5 / FT10: IHM interface used with Altus CPs through serial port by Alnet I protocol.

Functional Characteristics

	GR310	GR316	GR330	GR350	GR351	GR370	GR371
Digital Inputs	6	10	14	14	14	14	14
Transistor outputs	4	4	8	8	8	8	8
Relay outputs	0	2	2	2	2	2	2
High speed outputs	0	0	0	2	2	2	2
Counters	0	0	0	1 (24 bits)	1 (24 bits)	1 (24 bits)	1 (24 bits)
Interruption input	1	1	1	1	1	1	1
Analogue inputs	0	0	0	0	0	4	4
Analogue inputs with thermocouple	0	0	0	0	0	2	2
Analogue outputs	0	0	0	0	0	2	2
Real time clock module GR380	No	No	No	Yes	Yes	Yes	Yes
Maximum module expansions	0	0	0	0	1	0	1
Maximum I/O points with expansions	10	16	24	24	56	24	56
Modbus protocol (slave)	No	No	Yes	Yes	Yes	Yes	Yes
Application program memory – Flash type (bytes)	8 K	8 K	16 K	32 K	32 K	32 K	32 K
Application program memory – RAM type	8 K	8 K	16 K	32 K	32 K	32 K	32 K
Retentive bit memory (words 16 bits)	16	16	32	32	32	32	32
Total memory amount for operands	1 K	1 K	4 K	8 K	8 K	8 K	8 K
Floating point math operation	No	No	No	Yes	Yes	Yes	Yes
Keyboard	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Serial interfaces	1x RS232	1x RS232	1x RS232	1x RS232	1x RS232	1x RS232	1x RS232
HardFlex Architecture®	No	No	No	Yes	Yes	Yes	Yes
MasterTool Programming MT4100 or MT4000	3.51 or greater version			3.60 or greater version			

Notes:

Counters: the standard product has 1 counter with 24 bits resolution and 12 counter modes. Different configuration can use HardFlex® architecture functions, which can be provide by consulting.

Counter Inputs: the counter and digital input use the same connection, I1 to I4 inputs. The user can choose how to use the connection, counter or digital functions.

High Speed Outputs: the modules that use this characteristic are supply with the HardFlex GR900, that allows the use of two outputs with frequency up to 20 KHz. These outputs can be configure with other characteristics according to different HardFlex configurations. Optionally the outputs can be used like common digital low current.

Interruption Input: the digital and interruption input use the same connection, I0 input. With the use of E-020 module, on application program, the input will be set to positive edge interrupt. Otherwise the input will be set like common digital input.

Expansion Modules: the GR351 and GR371 can be used like expansion modules. The expansion executes a different application program (Ladder), that changes information through a expansion bus with high speed characteristics.

Real Time Clock Module: The GR380 module allows this characteristic.

MasterTool: The Serie Grano is programmed by any MasterTool with hardkey upper than 3.51 version, including MasterTool PL.

HardFlex Architecture: The modules which permit the use of HardFlex architecture comes with native GR900 version. Versions with different solutions are available to order.

General Characteristics

|	GR310, GR316, GR330, GR350, GR351, GR370, GR371
Status and diagnostic LEDs indicators	EX, PG, ER, DG, AI,TR One LED by I/O point
On line programming	Yes
Typical program scan time	1,6 ms / Kwords
RS232 Communication port (COM 1)	TX, RX, RTS and CTS
Maximum analog I/O points	Limited by the availability of UCP and expansion modules analog channels
Power supply protection	Polarity inversion
Watchdog	Yes
Terminal and Connector Configuration	1 RJ45 connector (COM 1) Spring terminals to field wiring connection
External power supply	19 to 30 Vdc including ripple
Isolation voltage from logical circuit	No isolation between user and system
Maximum power consumption	150 mA
Power dissipation with full load	3,6 W
Standards	IEC 61131
Weight	200 g
Operating temperature	0 to 60 ^{o}C
Dimensions (W x H x D) mm	100 x 127 x 54

Serial Port

The GR3xx micro controllers have a optimal communication capability, that provides a wide range of communication features. It allows the communication among several equipment by Alnet I V2.0 or Modbus RTU protocols. The communication rates for the serial port are the following:

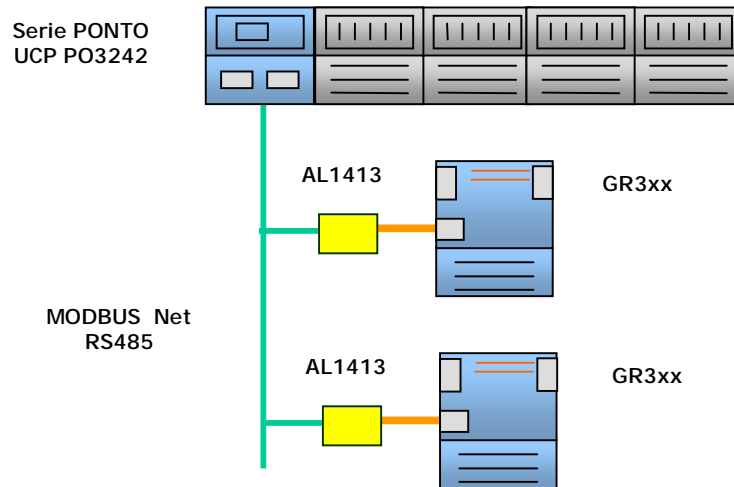|	Communication Rate (bps)
ALNET I	9600, 4800, 2400, 1200, 600, 300
MODBUS	19200, 9600, 4800, 2400, 1200, 600, 300

The serial port allows the connection of modems or radio modems that use RTS and CTS signals.

In addition, the PO9901 – WebGate Plus module adds an Ethernet port to the Serie Grano. This port provides communication capabilities that let the GR3xx UCP communicate with other Altus controllers, interfaces and runtimes software.

Runtime Software or IHMs Communication

IHMs or
Runtime

COM 1
RS232

GR3xx

MasterTool
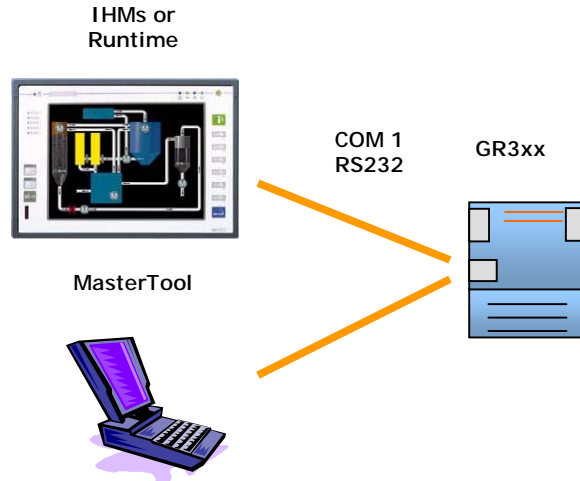
MODBUS Remote Communication

Serie PONTO
UCP PO3242

AL1413

GR3xx

MODBUS Net
RS485

AL1413

GR3xx

Ethernet Communication

The GR3xx micro controllers can be connected to an Ethernet net providing remote data acquisition and control functions. The UCP can be accessed by runtime software or browser allowing remote programming and I/O pass thru commands. Further more it is possible to communicate with other controller to interlocking commands.
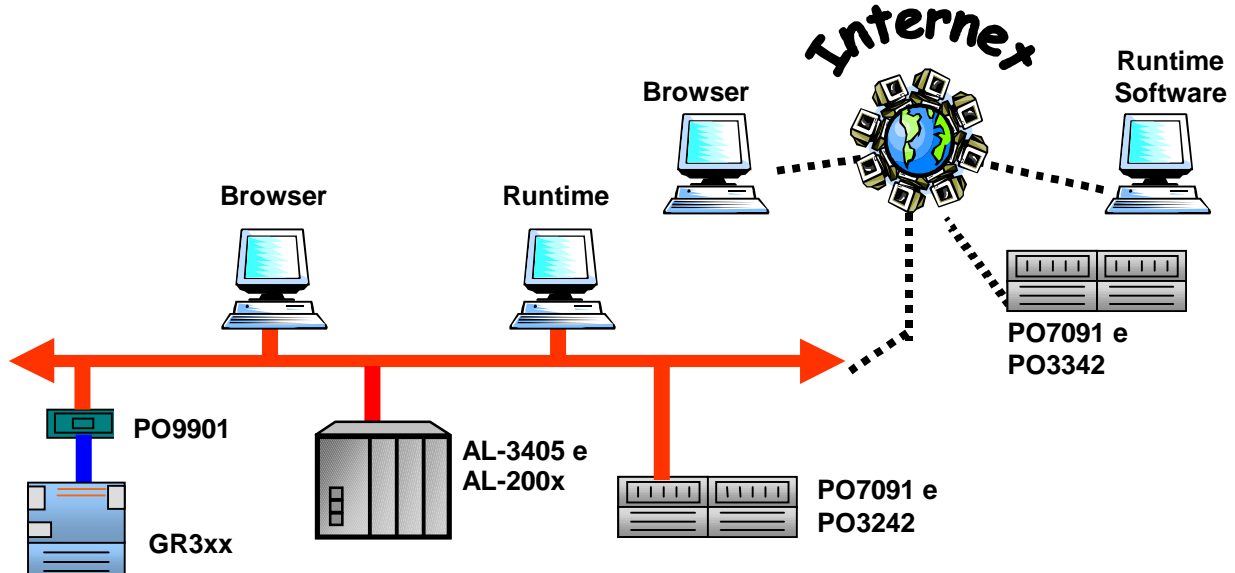
HardFlex Architecture

The HardFlex Architecture, which is native in some Serie Grano models, provides a flexible and capable structure with hardware reprogramming functions. This architecture allows the programming of specific functions according with user necessities to fill a process lack. It helps the communication between HardFlex CP and equipment with different communication standards. There are machines, sensors and transducers that have the same functions but use different communications standards, according to each manufacturer. HardFlex Architecture comes to bond and facilitate machine communication standard where the code and decode communication function is installed on CP. An example of this case can be find when the user purchases a transducer to position control. Supposing that the purchased transducer is the best for his application, but it comes with an uncommon signal. A CP to decode or code this signal can be expensive, difficult to find or will be necessary the development of special circuits to adjust the signal. It is possible with the use of CPs Grano a hardware reprogramming then the uncommon standard will be decode and process by the CPU. Also it exists the possibility to use functions with high speed outputs like PWM (Pulse Wide Modulation), PTO (Pulse Train Output), and other for closed control loop.
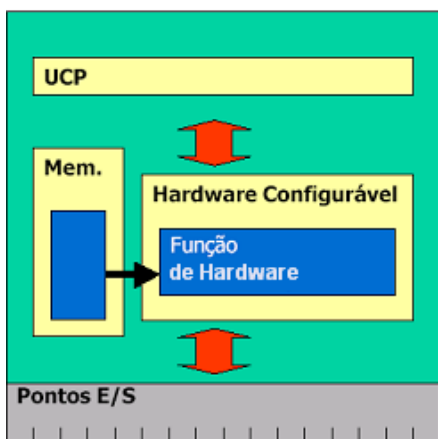
Digital Inputs

	GR310, GR316, GR330, GR350, GR351, GR370,GR371
Digital input model	24 Vdc sink digital input, not isolated
Input voltage	24 Vdc nominal 15 to 30 Vdc for 1 signal 0 to 5 Vdc for 0 signal
Input current	4,2 mA @ 24 Vdc
Input impedance	5,7 kΩ
Terminal block configuration	I0 to I7 (%E0) J0 to J5 (%E1)
Input type	Type 1, switches and 2 wire sensors
Input delay time	2 ms @ 24 Vdc (typical)
Isolation from logical circuit	No isolation between user and system
Status Indicator	One LED by input point

Relay Outputs

	GR316, GR330, GR350, GR371
Relay output model	2 relay outputs, dry contact, normally open
Resistive load	3 A @ 5 a 30 Vdc 0,5 A @ 48 Vdc 0,150 A @ 125 Vdc 1,5 A @ 125 Vac 1,5 A @ 240 Vac
Contact resistance	Maximum 100 mΩ
Isolation from logical circuit	1500 Vac for 1 minute, 250 Vac continuos
Minimum contact load	10 mA @ 12 Vdc
Terminal block configuration	R0 – R0 dry contact R1 – R1 dry contact
Expected life	10. 10^6 operations with nominal load
Operate / release Time	7,5 ms to close 8,5 ms to open
Switching frequency	Maximum 0,5 Hz with nominal load
Status indicator	One LED by output point

Transistor Outputs

	GR310, GR316, GR330, GR350, GR351, GR370, GR371
Transistor output model	8 transistor source outputs, 24 Vdc, not isolated
Output current	1A with all points on 2 A with only one point on by group of 4
Terminal block configuration	T0 to T7
Maximum output impedance	200 mΩ
Output signal delay	Maximum 300 us
Switching frequency	Maximum 500 Hz
Isolation from logical circuit	No isolation between user and system
Protection	Short circuit and over current
Diagnostic indicator	Over current cutoff voltage
Status indicator	One LED by output point

High Speed Outputs

	GR350, GR351, GR370, GR371
High speed output model	2 source outputs, not isolated
Minimum voltage output	20 Vdc @ 24 Vdc power supply
Output modes	PTO (Pulse Train Output) Mode PWM (Pulse Wide Modulation) Mode VF (Variable Frequency) Mode
Output current	16 mA source with RL = 1,5 kΩ
Terminal block configuration	F0 and F1 – HardFlex outputs or bits 2 and 3 from second output octet
Switching frequency	0 to 20 kHz
Protection	Short circuit
Isolation from logical circuit	No isolation from user and system
Diagnostic indicator	Short circuit

Notes:

It is suggest the use of an external impedance of 1,5 kΩ.

These outputs can be used for:

- Stepper motor control position
- Connection to converter blocks F/V (frequency / voltage) increasing analog output capacity

Not only standard functions can be set to high speed outputs but also new functions with special characteristics that changes the hardware behavior. New functions modules can be supply (under consulting) for complex high speed application and time critical functions.

Counter Inputs

	GR350, GR351, GR370, GR371
Counter input model	1 high speed counter, up/down, 24 bits
Voltage input	15 to 30 Vdc for 1 signal
	0 to 5 Vdc for 0 signal
Counter modes	12 counter modes
Terminal block configuration	I1 to I6 – HardFlex inputs or common digital inputs without filter
Input impedance	5,7 kΩ
Isolation from logical circuit	No isolation from user and system
Switching frequency	0 to 20 kHz

Notes:

Not only standard functions can be set to high speed outputs but also new functions with special characteristics that changes the hardware behavior. New functions modules can be supply (under consulting) for complex high speed application and time critical functions.

These outputs can be used for:

- Special fast counters
- Time difference between inputs
- Frequency converter to digital value, increasing analog capacity through converter V/F blocks
- It is available 6 high speed counter inputs, 4 set to factory configuration with 24 bits counter and 2 reserved for optimized functions. The high speed counter inputs and common digital inputs use the same terminals which will be set according application.

> ***Attention: In case of high speed counter and high speed output configuration see HardFlex GR9xx Technical Documentation for further information.***

Analog Inputs

	GR370, GR371		
Analog input model	4 analog inputs, not isolated		
Accuracy	$\pm$ 0,2 % Full scale @ 25 ^{o}C		
	$\pm$ 0,01% Full scale / ^{o}C		
Resolution	12 bits linearity guarantee		
Input impedance	1,3 MΩ (Voltage input)		
	13 kΩ (Two thermocouple inputs)		
Filter	2 ms, 150 ms, 1.2 s , 10 s configurable by software		
Maximum voltage without damage	+12 V		
Isolation from logical circuit	No isolation between user and system		
Terminal block configuration	A0 and A- , A1 and A-, A2 and A- , A3 and A-		
Crosstalk DC a 100 Hz	-72 dB min		
Scale	Range	Steps	Resolution
	0 to 10 Vdc	0 to 30.000	2,6 mV
Measurement scale loose	up to 5% above the maximum limit		
Scanning time	10 ms		
Measurement loose	if 5% above the maximum limit		
Diagnostic Indicator	Over range		

Notes:

Two analog inputs can be used for temperature measurement with thermocouples.

The filtering parameterization is set by software according available values. It is resolve by software and simulated time constant RC analogue filter.

Thermocouple Input

	GR370, 371			
Thermocouple input model	2 Thermocouple inputs. Thermocouple must be isolated			
Accuracy	$\pm$ 0,4 % Full scale @ 25 ^{o}C			
	$\pm$ 0,01% Full scale / ^{o}C			
Resolution	12 bits linearity guarantee			
Temperature Unit	Configurable: ^{o}C or ^{o}F			
Input impedance	13 kΩ			
Maximum voltage without damage	+12 Vdc			
Filter	400 ms, 1 s or 10 s configurable by software			
Terminal block configuration	A0 e A- , A1 e A-			
Cold junction compensation range	Temperature sensor			
	Compensation range: temperature environment at 80 ^{o}C			
	Precision $\pm$ 5 ^{o}C			
Scanning time	100 ms			
Isolation from logical circuit	No isolation between user and system			
Initial temperature	Ti = environment temperature			
Supported thermocouple ºC ITS-90 Graphic	Model	Temperature	Step	Resolution
	J	Ti to 750 ^{o}C	0 a 7500	0,5 ^{o}C
	K	Ti to 1250 ^{o}C	0 a 12500	0,5 ^{o}C
Supported thermocouple ºF ITS-90 Graphic	Model	Temperature	Step	Resolution
	J	Ti to 1382 ºF	320 a 13820	1 ºF
	K	Ti to 2282 ºF	320 a 22820	1 ºF
Scale loose	up to 5% above the maximum limit			
Diagnostic	Open circuit			
	Over range			

Notes:

The thermocouple must be isolated, without machine contact.

The terminal A- must be used only for analog input with negative signal polarity.

The terminals A0, A1, A2 e A3 must be connected to positive signal voltage.

Temperature: the thermocouple must be connected only on A0 – A- e A1 – A-. The terminals A- must be connected to a negative polarity. The temperature is measured over the initial temperature.

Analog Outputs

	GR370, GR371		
Analog output model	2 analog outputs, not isolated		
Accuracy	± 0,2 % Full scale @ 25 $^{\circ}$C		
	± 0,01% Full scale / $^{\circ}$C		
Terminal block configuration	P0 e P- , P1 e P-		
Scale	Range	Step	Resolution
	0 to 10 Vdc	0 to 30.000	2,6 mV
Output current	5 mA typical with RL = 2 kΩ		
Resolution	12 bits		
Scanning time	12 ms		
Scale loose	Minimum 4%		
Isolation from logical circuit	No isolation between user and system		
Protection	Short circuit		

Real Time Clock Module

The real time clock module is an optional item and must be buy independently because it can be used only in some modules.

	GR380
Real time clock module	Clock to count second, minute, hour, month, day, day of week and year
Resolution	One second
Leap year	Automatic until 2100 year
Maximum Error	One minute / month @ 25 ºC
Clock backup	Lithium battery
Battery life expect	4 years or more @ 25 ºC
Operating Temperature	0 to 60 ºC

Software Characteristics

	GR310, GR316, GR330, GR350, GR351, GR370, GR371
Programming language	Diagram and logic blocks, structured in modules with functions and sub-routines
On line programming	COM 1
Input (E) and output (S) operands	256
Auxiliary operands (bits)	512
Numeric operands memory (words 16bits)	1 Kbytes on GR310 1 Kbytes on GR316 4 Kbytes on GR330 8 Kbytes on GR350 and GR351 8 Kbytes on GR370 and GR371
Available operands **(some models do not use floating point operands)**	M memory 16 bits D BCD 32 bits F floating point TM memory table TD BCD table TF floating point table KM 16bits constant KD BCD constant KF floating point constant
Typical memory occupation by contact instruction	7 bytes

Notes:

All numeric operands (KM, KD, M, D, TM, TD and TF) allow values representing with arithmetic signal. The application program configures the number of simple operands and tables (M, D, TM, TD and TF), which it is limited by the available operands memory capacity (see comparative table).

Instruction List

	Instruction
Relay Contact	`-|/|-` : Close relay (examine if close)
	`-|  |-` : Open relay (examine if open)
	`PSL` : Pulse relay
	`RM` : Master relay
	`FRM` : Master end relay
	`-(  )-` : Single relay coil output
	`-(L)-` : Energize relay coil output
	`-(D)-` : De-energize relay coil output
	`-(S)-` : Jump relay coil output
Data Handling	`MOV` : Simple operand movement
	`MOP` : Operand block movement
	`MOB` : Operand block movement
	`MOT` : Table movement
	`CAB` : Block charge
Comparison	`CAR` : Operand charge
	`=` : Equal
	`<` : Less than
	`>` : Bigger than
Arithmetic	`+` : Addition
	`-` : Subtraction
	`/` : Division
	`x` : Multiplication
Conversions	`B/D` : Binary decimal conversion
	`D/B` : Decimal binary conversion
Binary operations	`AND` : Binary AND
	`OR` : Binary OR
	`XOR` : Binary XOR
	`NEG` : NOT operator
Counting	`CON` : Simple counter
	`COB` : Up / down counter
Timing	`TEE` : Timer on-delay
	`TED` : Timer off-delay
Indexed	`LDI` : On/off indexed points
	`TEI` : Status test for indexed points
	`SEQ` : Sequence
Sub routines	`CHF` : Function module call
	`CHP` : Procedure module call

Module Functions List

|	Function Modules Description
F-PID.033	PID algorithm function.
F-RAIZN.034	Square root for memory or real operand. In case of memory operand the result can be normalized for a previously scale.
F-ARQ2.035	It allows the storage for large data quantities, using register and fields concepts.
F-ARQ4.036	
F-ARQ8.037	
F-ARQ12.038	
F-ARQ15.039	
F-ARQ16.040	
F-ARQ24.041	
F-MOBT.043	Improve block copies between numeric and table operands.
F-STCP.044	CP status operands
F-CTRL.059	Improve lead / lag algorithms .
F-PID16.056	Improve proportional, integral and derivative controlling (it has some differences from F-PID.033).
F-NORM.071	Operand normalizes function.
F-COMPF.072	Compare operands according a range.
F-AES.087	Executes an immediately scanning of I/O points with image memory actualization and specified physical positions.
F-ANDT.090	Improve logical operation AND between simple operands (M or D) and/or tables (TM or TD). It can be perform up to 255 logical operations with one unique function call.
F-ORT.091	Improve logical operation OR between simple operands (M or D) and/or tables (TM or TD). It can be perform up to 255 logical operations with one unique function call.
F-XORT.092	Improve logical operation XOR between simple operands (M or D) and/or tables (TM or TD). It can be perform up to 255 logical operations with one unique function call.
F-NEGT.093	Improve logical operation NOT between simple operands (M or D) and/or tables (TM or TD). It can be perform up to 255 logical operations with one unique function call.
F-M_F.050	Convert two round number to floating point value.
F-F_M.051	Convert floating point value to two round numbers.
F-FSOM.052	Floating point addition.
F-FSUB.053	Floating point subtraction.
F-FMUL.054	Floating point multiplication.
F-FDIV.055	Floating point division.

|	UCPs	Related Products
F-PID.033	GR370, GR371	F Modules available within MasterTool Programming
F-RAIZN.034	GR310, GR316, GR330, GR350, GR351, GR370, GR371	
F-ARQ2.035		
F-ARQ4.036		
F-ARQ8.037	GR330, GR350, GR351, GR370, GR371	
F-ARQ12.038		
F-ARQ15.039	GR350, GR351, GR370, GR371	
F-ARQ16.040		
F-ARQ24.041		
F-MOBT.043	GR310, GR316, GR330, GR350, GR351, GR370, GR371	
F-STCP.044		
F-CTRL.059	GR370, GR371	
F-PID16.056		
F-NORM.071	GR310, GR316, GR330, GR350, GR351, GR370, GR371	
F-COMPF.072		
F-AES.087		
F-ANDT.090		
F-ORT.091		
F-XORT.092		
F-NEGT.093		
F-M_F.050	GR310, GR316, GR330, GR350, GR351, GR370, GR371	F Module available within AL-2700 function package
F-F_M.051		
F-FSOM.052		
F-FSUB.053		
F-FMUL.054		
F-FDIV.055		

Note:

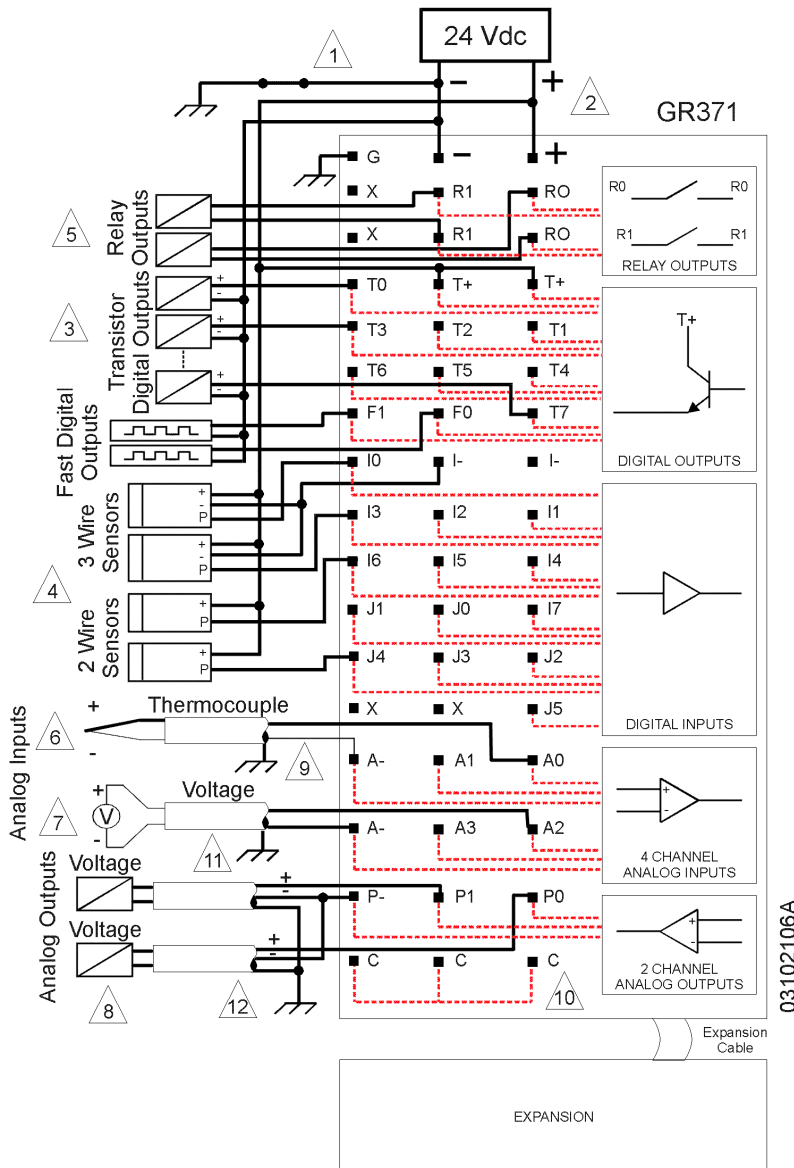The functions not included on MasterTool Programming can be purchased separately.

Terminal Connection

The following pictures illustrate the electric diagram connection for Serie Grano.
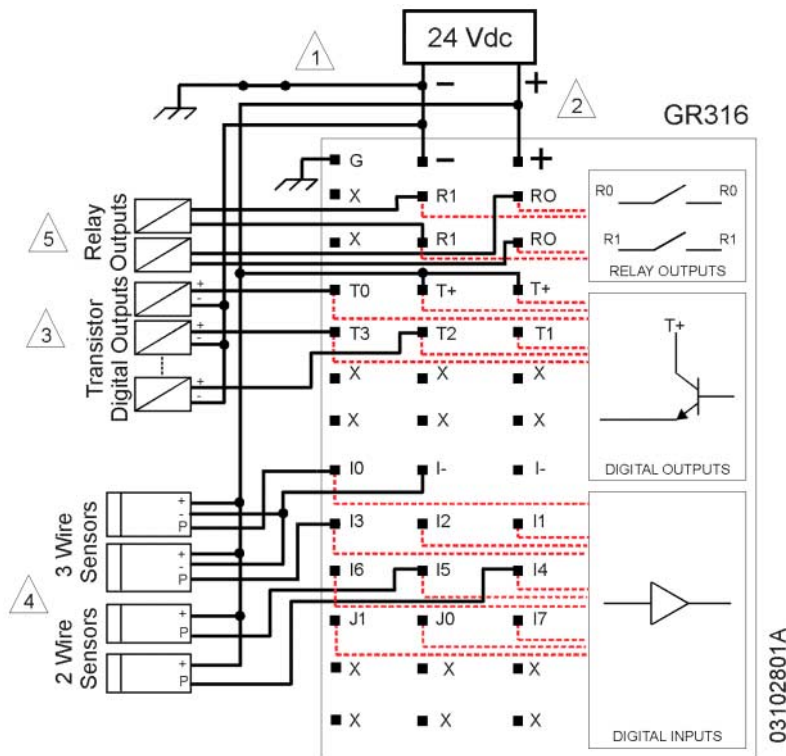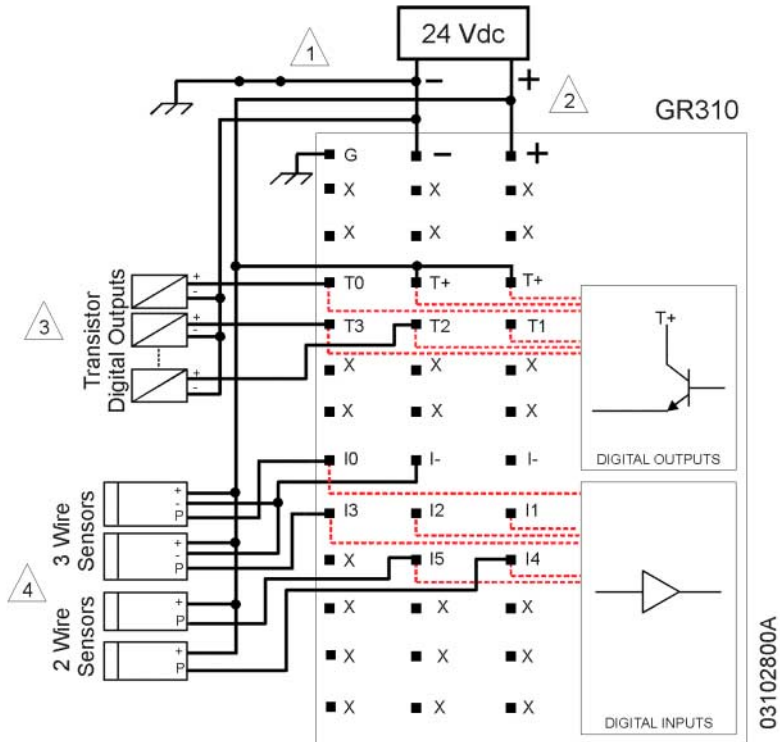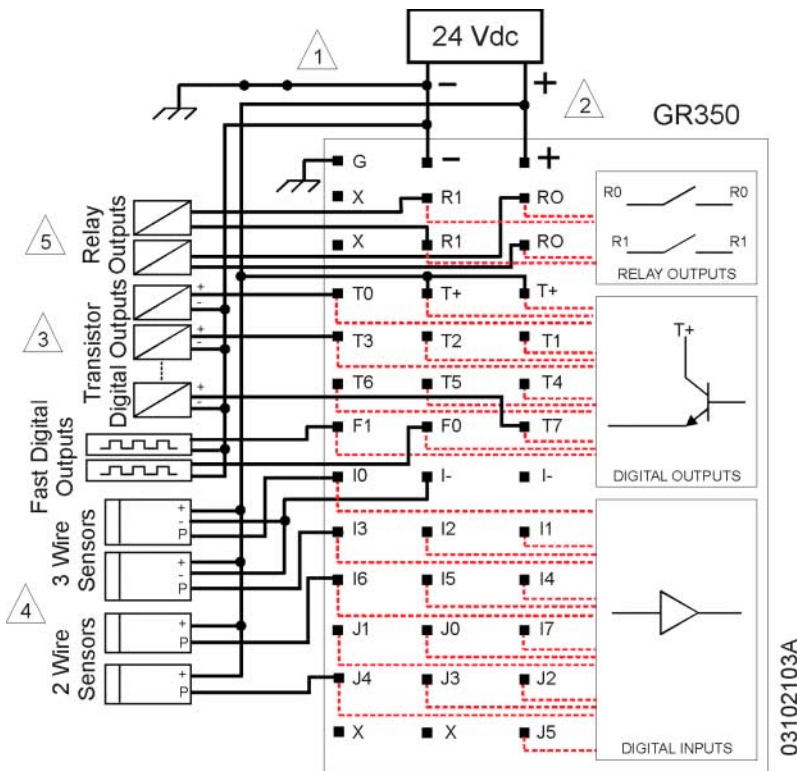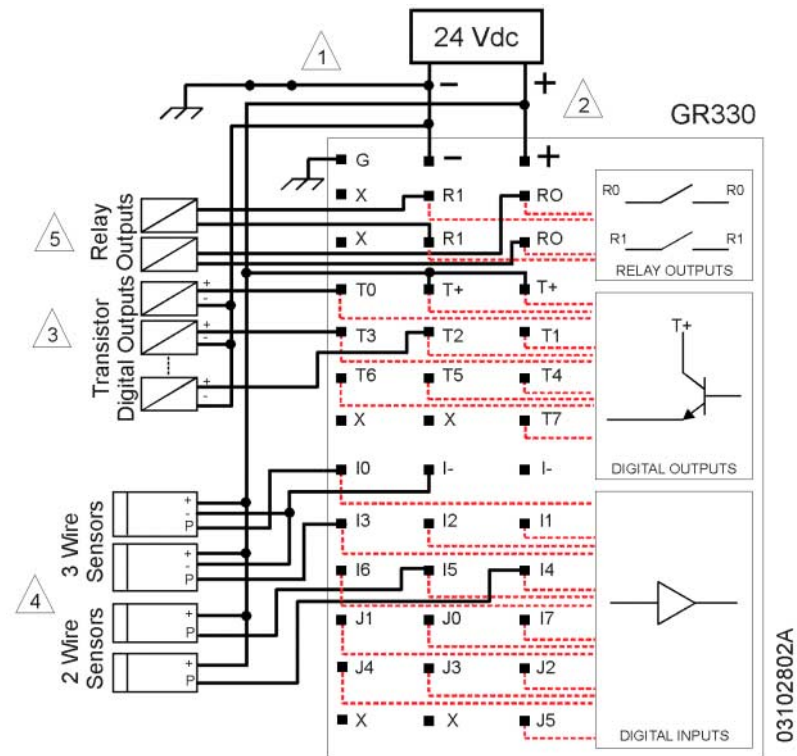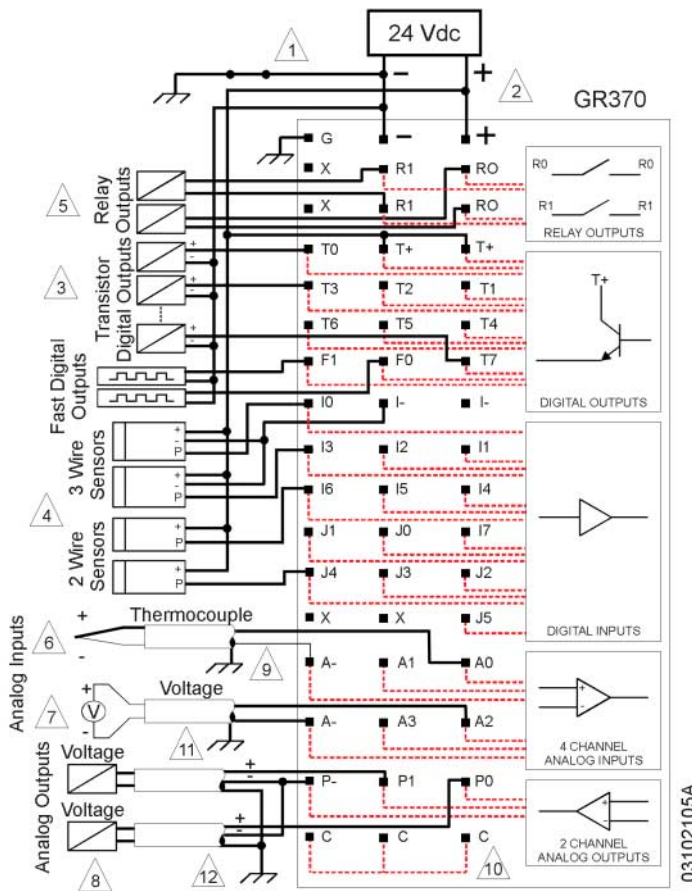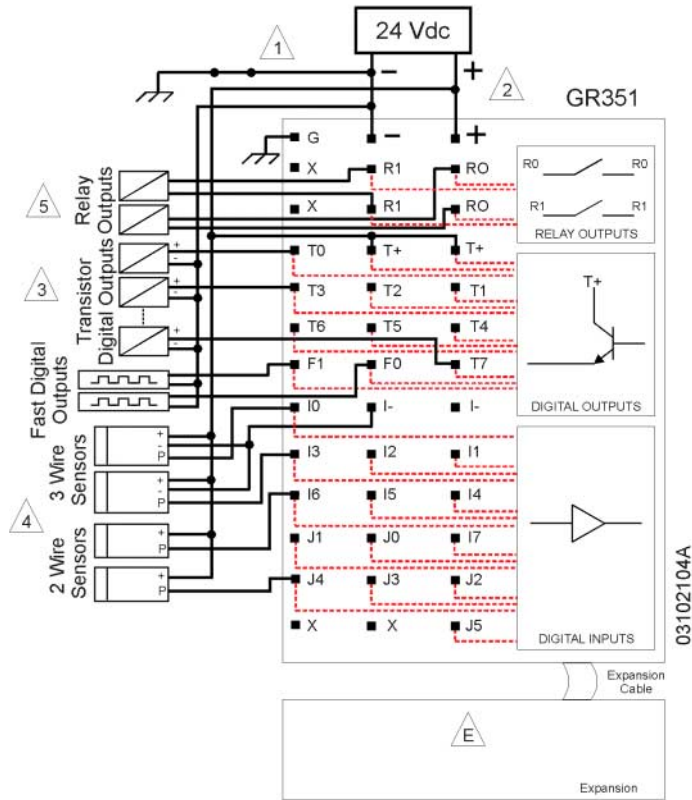
Notes

1- The power supply common point (0 V) must be connected to electrical panel grounding . This connection is suggested to minimize electrical noise on the automation system.

2- The power supply must be connected to + (+24 Vdc) and - (0 V) terminal module, according to electrical diagrams. The power supply must be projected to support the micro controller load, input components (sensors) load and output components load.

3- The T+ terminals drive energy to transistor outputs and must be connected to +24 Vdc power supply. It is suggest the use of protection circuits to reduce electrical noise and assure output operation.

4- The digital inputs work with sensors that use PNP output (positive switching) or dry contacts. It can be used sensors with two or three wires. The sensors must be connected to any I0 and I7 or J0 and J5 terminal. The negative terminal of the three wire sensors must be connected to any I- terminal. The sensors must supply correctly signal according to micro controller specification.

5- It is necessary the use of protection circuits when loads are actuated by relay contacts.

6- The thermocouple measurement must be done by the connection of positive pole to A0 and A3 terminals and the negative pole to A-. The environment temperature compensation – cold junction – is made automatically by native module sensor. In case of open thermocouple junction the values will go to end of scale, which it will activated the open thermocouple diagnosis.

7- In case of voltage measurement the positive pole must be connected to A0 and A3 terminals and the negative pole to A- terminals, which are common for all inputs. The micro controller only measures positive voltages. If any negative voltage is driven in the inputs, they will be short circuited by a diode with the 0 Vdc. In this case the value will be zero.

8- The voltage outputs have the positive pole connected to P0 and P1. The negative pole is connected to A terminal, which is common for the two outputs. The P- terminal is internally connected to 0 Vdc.

9- It is suggest the use of shielded cable when using thermocouple measurement. The thermocouples cables must be grounded in one extremity and most near from module terminal connection.

10- The three terminals C are short circuited, providing different points to connections.

11- The analog input signals must be grounded only in one extremity and most near from module terminal connection

12- The analog output signals must use shielded cable. The cables must be grounded in one extremity and most near from module terminal connection.

13- The models that allows modules expansion are connected by the expansion cable GR381.

Physical Dimensions

mm dimensions

61.8

12.4

28.0

116.6

03052900A

99.0
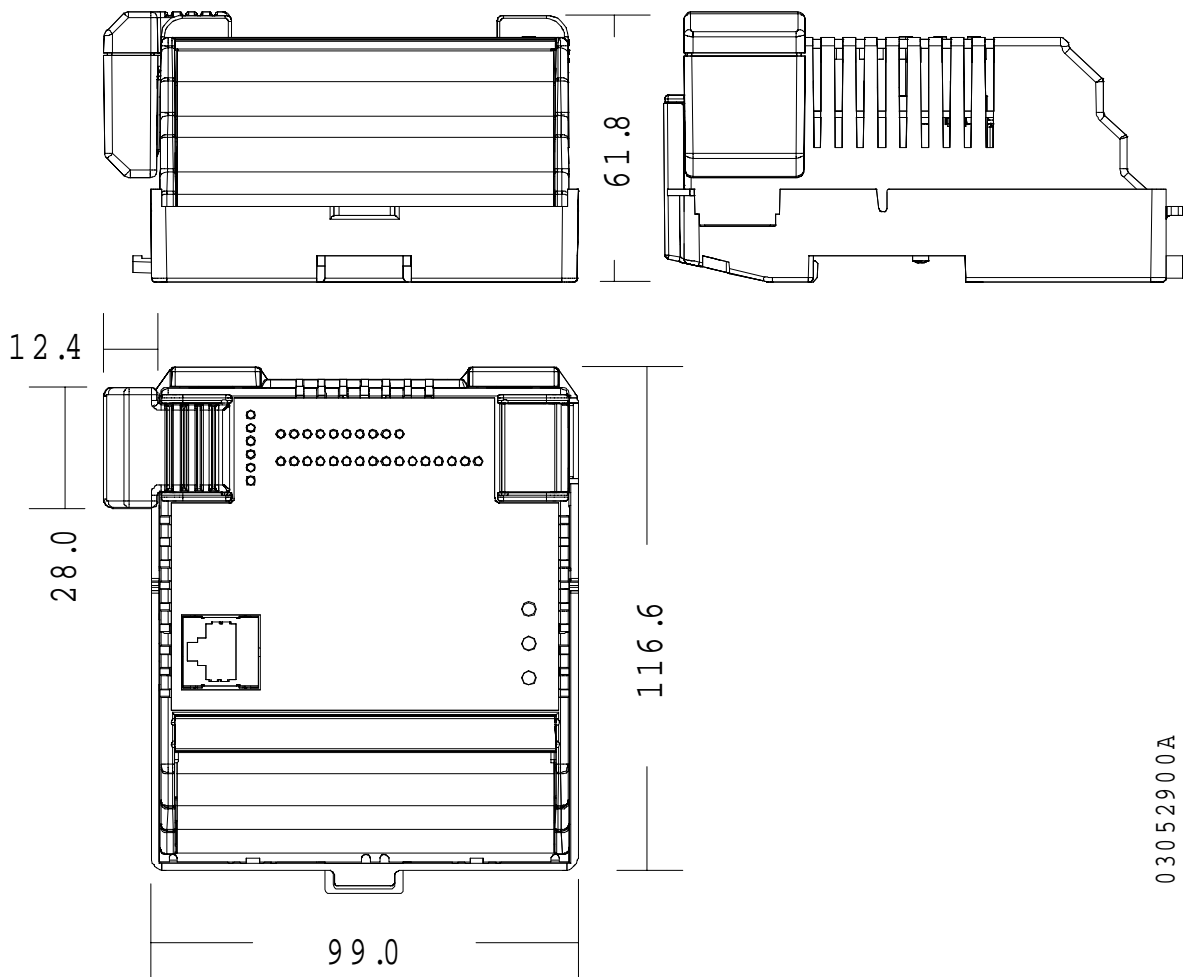
Manuals

For correct application and utilization the **User's Manual** must be consulted.

For further technical details, configuration, installation and programming of Serie Grano ® products please consult following documents::

Document code	Description
MU210000	Serie Grano User's Manual
MAN/MT4100	MT4100 User's Manual