Doc. Code: CE113100 Revision: G

Product Description

The Duo series of programmable controllers (PLC) with incorporated Human Machine Interface (HMI) is the ideal solution for applications which requires control and supervision in a single product and environment. This solution was designed through a hardware architecture based on 32-bit processors and high performance. The main product features are the speed of application processing, the high density of I/O integrated points, the connectivity with other elements of the environment through two serial ports and the requirements for axes positioning using fast inputs and outputs.

The programming of the product is performed through a single tool, using for that six PLC programming languages (five of them described in IEC 61131-3: LD, ST, IL, FBD and SFC) plus an additional language (CFC). MasterTool IEC has an important simulation feature that allows the user to test the application without the use of equipment, thus allowing greater agility in the program development.

In addition to an HMI that supports text and graphics, alphanumeric keypad, 7 function keys, the innovation of the product is also found in his presentation. The Duo ID allows the client to customize the *design* of the product with its brand according to the application and the visual identity of your business.

The main product features are:

- MasterTool IEC programmer with 6 programming languages, where 5 are described by IEC 61131-3 standard, plus one additional language.
- 20 insulated digital inputs, where 6 are fast points configurable for 2 two-way counters, 4 one-way counters or for positioning functions.
- 14 insulated digital outputs (relay or transistor)
- 2 insulated digital transistor outputs configurable as 2 fast outputs points – PTO, PWM/VFO – or for positioning functions.
- 4 analog inputs – configurable as 0 to 10 V, 0 to 20 mA or 4 to 20 mA
- 2 analog outputs – configurable as 0 to 10 V or 0 to 20 mA or for positioning functions.
- Graphics LCD display with a 128 x 64 dot matrix – fully configurable by MasterTool IEC software
- Membrane keyboard with 25 keys
- Real-time clock
- One RS-232 serial port for programming, MODBUS master and slave protocol and generic protocol
- One RS-485 serial port for MODBUS master and slave protocol and generic protocol
- 24 Vdc insulated power supply
- 256 Kbytes application memory
- Capacity up to 1250 bytes of retain memory without battery

Ordering Information

Included Items

The packaging of the product contains the following items:

- DU350 or DU351 module
- 8 connectors
- Installation guide

Product Code

The following code should be used to purchase the product:

Code	Denomination
DU350	PLC WITH HMI 20 DI 16 DO (T) 4 AI 2 AO
DU351	PLC WITH HMI 20 DI 14 DO (R) 2 DO (T) 4 AI 2 AO

Notes

DU350: model with transistor digital outputs.

DU351: model with relay digital outputs.

Related Products

The following products must be purchased separately when necessary:

Code	Denomination
AL-1714	Cable RJ45 – RJ45 RS-232 (PICCOLO)
AL-1715	Cable RJ45 - DB9 FC
PO8500	Expansion cable 0.4 m
PO8501	Expansion cable 1.4 m
PO8525	RS-485 network splitter and termination
FBS-USB-232M9	USB to RS-232 serial converter / 2m

Notes

AL-1715: this cable has a serial RJ45 connector and other DB9 RS-232C female IBM/PC standard. It should be used to communicate the module with MasterTool IEC software and for point-to-point RS-232 interface communication using the RTU MODBUS protocol.

AL-1714: this cable has a RJ45 connector at each end and is used for point-to-point RS-232 communication interface between two DU350 or two DU351, using the RTU MODBUS PROTOCOL..

PO8500 and PO8501: these cables have a RJ45 connector at each end. They are used to connect the RS-485 splitter PO8525 with the RS-485 serial port of DU350 or DU351.

PO8525: this module is used to split and terminate a RS-485 network. Each node in the network must have a PO8525. In RJ45 connector of PO8525 the RS-485 of DU350 or DU351 communication interface must be connected to. The PO8525 that are located on the end of the network must be configured as termination, the remaining units as splitters.

FBS-USB-232M9: this cable is used as a USB to RS-232 serial converter. For use with DUO Series, just connect this converter to DB9 female of AL-1715 cable.

Product Features

General Features

	DU350, DU351
Number of digital input points	20 insulated digital inputs points 14 general purpose digital inputs 6 fast digital inputs (fast inputs can be used as counters or general purpose inputs)
Number of relay/transistor output points	16 insulated digital output points 2 fast output points and 14 transistor output points (DU350) 2 fast output points and 14 relay output points (DU351)
Number of fast output points	2 fast output points (PTO, PWM, frequency or digital output)
Fast counters	6 fast points divided into 2 blocks configurable as one/two-way (2 counters per block)
Analog inputs	4 analog inputs: 0 to 10 V , 0 to 20 mA or 4 to 20 mA
Analog outputs	2 analog outputs: 0 to 10 V or 0 to 20 mA
Real Time Clock RTC	Yes, retains data for 15 days without power supply Resolution of 1 s and maximum variance of 2 s per day
Display	Graphical monochrome LCD display, with a dot-matrix of 128 x 64 pixels, backlight and contrast control
Keyboard	Membrane keyboard with 25 keys
MODBUS protocol	Master and slave RS-232 and RS-485
Field application download	RS-232
Online programming	No
RS-232 interface	Yes, one interface with modem signals: TXD, RXD, RTS, CTS, DTR, DSR, DCD
RS-485 interface	Yes, non-insulated
Watchdog circuit	Yes
External power supply voltage	19 to 30 Vdc
24 Vdc input current	350 mA
Power consumption	8.4 W
Maximum power supply interruption	10 ms @ 24 Vdc
Power supply insulation	Yes
Initialization time	10 s
Related standards	IEC 61131-3:2003
Weight	600 g
Operation temperature	0 to 60 °C
Storage temperature	-20 to 75°C
Front panel protection	IP 54
Back panel protection	IP 20
Dimensions	180.1 x 144.1 mm

Notes

RTC: in environments with temperature of 25 °C. Up to the maximum product operation temperature the retain time can vary between 10 to 20 days.

Digital Inputs

	DU350, DU351
Number of inputs	20 digital inputs divided into 3 insulation groups: I00 to I08 – 9 inputs – Group 0 I10 to I18 – 9 inputs – Group 1 I20 to I21 – 2 inputs – Group 2
Input voltage	14 to 30 Vdc (common reference) for state 1 0 to 5 Vdc (common reference) for state 0
Input current	5 mA (24 Vdc common reference) – general purpose inputs 15 mA (24 Vdc common reference) – fast inputs
Input type	Sink, type 1
Input impedance	4.3 kΩ – general purpose inputs 1.5 kΩ – fast inputs
Insulation	2000 Vac for one minute between each input group 2000 Vac for one minute between input group and logic circuit
Terminal block configuration	The digital inputs are divided in 3 connectors (insulation groups) insulated among themselves and insulated from the logic circuit. Each connector is composed of a terminal block for each input and a terminal block to the reference voltage. I00 to I08 – input 0 to 8 of the insulation group 0 I10 to I18 – input 0 to 8 of the insulation group 1 I20 to I21 – input 0 to 1 of the insulation group 2 C0 – common of the insulation group 0 C1 – common of the insulation group 1 C2 – common of the insulation group 2 Inputs I00 to I02 and I10 to I12, are fast inputs. Inputs I00 to I02, belong to Block 0 fast inputs; inputs I10 to I02 belong to the Block 1 fast inputs. Fast inputs can be used as general purpose inputs.
Response time	0,5 ms – general purpose inputs 10 μs – fast inputs
Status indication	Can be accessed via HMI at product standard screens

Note

Response time: the maximum response time for general purpose digital inputs will be the response time plus the maximum cycle time.

Transistor Digital Outputs (DU350)

	DU350
Number of common outputs	14 transistor digital outputs divided into 2 insulation groups: Q02 to Q07 – 6 outputs – Group 0 Q10 to Q17 – 8 outputs – Group 1
Maximum current per point	0.5 A
Output type	Transistor, source type
Switching time	600 μs
Maximum switching frequency with load	250 Hz with minimum external load of 12500 Ω
Status indication	Can be accessed at product standard screens
Protection	TVS diode in all transistor outputs
Operation voltage	10 to 30 Vdc
Insulation	2000 Vac for one minute between each output transistor group 2000 Vac for one minute between output transistor group and logic circuit
Output impedance	500 mΩ
Terminal block configuration	Transistor digital outputs are divided into 2 connectors (insulation groups). Each connector is made up of a terminal block for each output, a terminal block to the common contact (supply) and a 0 V reference terminal block. Q02 to Q07 – transistor output 2 to 7 of insulation group 0 Q10 to Q17 – transistor output 0 to 7 of insulation group 1 C5 – reference (0 V) insulation group 0 (shared with fast outputs) C6 – power supply of insulation group 0 (shared with fast outputs) (maximum 30 Vdc) C7 – reference (0 V) insulation group 1 C8 – power supply of insulation group 1 (maximum 30 Vdc)

Notes

Maximum current per point: the transistor output has no overload protection. If output protection is necessary, an external fuse must be used with the product.

Terminal block configuration: the insulation group 0 has two fast transistor outputs (Q00 and Q01).

Relay Digital Outputs (DU351)

	DU351
Number of outputs	14 relay digital outputs divided into 2 insulation groups: Q02 to Q07 – 6 outputs – Group 0 Q10 to Q17 – 8 outputs – Group 1
Maximum current per point	1 A
Output type	Normally open relay
Minimum load	5 mA
Expected useful life	$10x10^4$ operations with rated load
Maximum commutation time	10 ms
Maximum switching frequency	0.5 Hz with maximum rated load
Status indication	Can be accessed at product standard screens
Maximum voltage (C6,C8)	30 Vdc insulation group 0 30 Vdc insulation group 1 240 Vac insulation group 1
Insulation	2000 Vac per one minute between each output group 2000 Vac per one minute between output group and logic circuit
Resistance contact	< 250 mΩ
Terminal block configuration	The relay digital output is divided into 2 connectors (insulation groups). Each connector is made up of a terminal block for each output, a terminal block to the common contact to all relays of the same connector and a 0 V terminal block (only used in transistor outputs). Q02 to Q07 – output relay 2 to 7 of insulation group 0 Q10 to Q17 – output relay 0 to 7 of insulation group 1 C5 – - not used for relays output C6 – common relays of insulation group 0, and used for supply fast outputs. In the output option type SINK (0 Vdc in PIN C6) fast outputs Q00 and Q01 cannot be used. The relays of insulation group 0 cannot trigger AC loads The use of alternated voltage in pin C6 may cause irreparable damage to the product. C7 – Pin not used for relay outputs. C8 – Pin connected to the common of relays of the insulation group 1.

Notes

Maximum current per point: the relay output has no overload protection. If output protection is necessary external fuse to the product should be used.

Terminal block configuration: the insulation group 0 has two fast transistor outputs (Q00 and Q01).

ATTENTION**:**
The use of alternated voltage in pin C6 may cause irreparable damage to the product.

Fast Digital Outputs

<table>
<tr><th></th><th colspan="2">DU350, DU351</th></tr>
<tr><td>Number of outputs</td><td colspan="2">2 fast:
Q00 and Q01</td></tr>
<tr><td>Maximum current per point</td><td colspan="2">0.5 A</td></tr>
<tr><td>Output type</td><td colspan="2">Transistor (“Source“ type)</td></tr>
<tr><td>Maximum frequency of pulse generation</td><td colspan="2">50 kHz</td></tr>
<tr><td rowspan="4">Minimum pulse bandwidth
@ 24 Vdc</td><td>Minimum external load</td><td>Minimum pulse time</td></tr>
<tr><td>No load</td><td>20 μs</td></tr>
<tr><td>1000 Ω</td><td>4 μs</td></tr>
<tr><td>50 Ω</td><td>2 μs</td></tr>
<tr><td>Status indication</td><td colspan="2">Through reserved fixed operands</td></tr>
<tr><td>Protection</td><td colspan="2">TVS diode in all transistor outputs</td></tr>
<tr><td>Operation voltage</td><td colspan="2">10 to 30 Vdc</td></tr>
<tr><td>Insulation</td><td colspan="2">2000 Vac per one minute between each output group
2000 Vac per one minute between output group and logic circuit</td></tr>
<tr><td>Output impedance</td><td colspan="2">700 mΩ</td></tr>
<tr><td>Terminal block configuration</td><td colspan="2">Fast outputs are located in the connector of digital output insulation group 0. The connector is made up of a terminal block for each output, a terminal block to the common contact (power supply) and a 0 V terminal block reference.

Q00 to Q01 – fast output 0 to 1 of insulation group 0
C5 - Reference (0 V), insulation group 0 (shared with the relay (DU351) / transistor (DU350) outputs)
C6 – Power supply, insulation group 0 (shared with the transistor outputs (DU350)). Maximum voltage 30 Vdc</td></tr>
<tr><td>Output modes</td><td colspan="2">PTO, VFO and PWM</td></tr>
<tr><td>Maximum number of used outputs</td><td colspan="2">2</td></tr>
<tr><td>Functions performed via software</td><td>PTO</td><td>VFO/ PWM</td></tr>
<tr><td></td><td>Writing of the value (number of pulses) to be generated
Writing of the number of pulses to be generated in the acceleration / des-acceleration
Start / end of the outputs operations
Fast outputs diagnostics
Monitoring of the current state of fast outputs</td><td>Writing of the frequency value to be generated in Hz (1 Hz to 50 kHz)
Writing of the outputs Duty-Cycle from 0 to 100 %
Start / end of outputs operations
Fast outputs diagnostics</td></tr>
<tr><td>Access way to fast outputs registers</td><td colspan="2">In reserved fixed operands</td></tr>
</table>

Notes

Maximum current per point: the fast transistor output has no overload protection. If output protection is necessary external fuse to the product should be used.

Functions performed via software: variation of 1 in 1 Hz or 1 in 1 % for frequency settings and duty cycle respectively.

ATTENTION:
During the product power on, fast outputs may change its state for approximately 100 us.

Analog Inputs

	DU350, DU351
Number of inputs	4 non insulated (of logic circuit) analog inputs
Input type	Voltage: 0 to 10 Vdc Current: 0 to 20 mA, 4 to 20 mA
Conversion resolution	12 bits
Terminal block configuration	AV0 – voltage input channel 0 AI0 – current input channel 0 C9 – common for inputs 0 and 1 AV1 –voltage input channel 1 AI1 –current input channel 1 AV2 –voltage input channel 2 AI2 –current input channel 2 C10 –common for inputs 2 and 3 AV3 –voltage input channel 3 AI3 –current input channel 3
Configurable parameters	Inputs type for each point, voltage or current Scale limit for each channel, maximum 30000 First order filtering with preset time constants
Protections	TVS diode in all analog inputs
Updating Time	1 ms per channel enabled

Note

Updating time: For product revisions before AX, the updating time is 60 ms total.

Voltage Mode

	DU350, DU351		
Precision	± 0.3% of scale limit @ 25°C ± 0.015% / ºC of the limit scale		
Crosstalk DC at 100 Hz	- 30 dB		
Input impedance	1.1 MΩ		
Maximum / minimum voltage without damage	12 Vdc / -0.3 Vdc		
Filtering	Configurable time constant Disabled, 90 ms, 140 ms, 1 s or 15 s		
Scale	Range	Counting	Sensitivity
	0 – 10 V	0 to 30.000	2.52 mV
Scale clearance	3 %		

Notes

Filtering: the time constant value can vary 10% of its nominal value. The maximum deviation of the constant time value is equal to the sampling rate. Ex: selecting the 140 ms constant time, the maximum time for the current value with filter to have 63% of the input value is: 140 ms * 110% + 60 ms = 214 ms. The "Disabled" option is available as of version 1.11 of the MT8200.

Counting: the scale limit may be modified by software, the maximum value is 30000.

Scale clearance: defines the percentage over limit scale that can be read by analog inputs. This characteristic can be used to compensate possible calibration errors of a used sensor.

Current Mode

	DU350, DU351		
Precision	± 0.3% of scale limit @ 25°C ± 0.015% / ºC of the limit scale		
Crosstalk DC @ 100 Hz	- 30 dB		
Input impedance	124.5 Ω		
Maximum/minimum continuous current without damage	25 mA / -2 mA		
Filtering	Configurable time constant: Disabled, 2 ms, 90 ms, 1 s or 15 s		
Scale	Range	Counting	Sensitivity
	0 – 20 mA	0 to 30.000	5.1 μA
	4 – 20 mA	0 to 30.000	5.1 μA
Diagnostic	Current below 3.8 mA (valid only with 4 - 20 mA scale; used to indicate an open circuit)		
Scale clearance	4 %		

Notes

Filtering: the time constant value can vary 10% of its nominal value. The maximum deviation of the time constant value is equal to the sampling rate. Ex: selecting the constant time equal to 1 s, the maximum time for the current value with filter to have 63% of the input value is: 1 s * 110% + 60 ms = 1.16 s. The "Disabled" option is available as of version 1.11 of the MT8200.

Counting: the scale limit may be modified by software, the maximum value is 30000.

Scale clearance: defines the percentage over limit scale that can be read by analog inputs. This characteristic can be used to compensate possible calibration errors of a used sensor.

Analog Output

	DU350, DU351
Number of inputs	2 non insulated (of logical circuit) analog outputs
Output type	Voltage: 0 to 10 Vdc Current: 0 to 20 mA
Conversion resolution	12 bits
Terminal block configuration	C3 –common for AO0 output AO0 – analog output 0 (configurable by software as voltage or current) C4 – common for AO1 output AO1 – analog output 1 (configurable by software as voltage or current)
Protection	TVS diode in all analog outputs
Configurable parameters	Type of signal on each channel (voltage or current) Scale limit per channel, maximum 30000

Voltage mode

	DU350, DU351		
Precision	± 0.3% of scale limit @ 25°C ± 0.015% / ºC of scale limit		
Crosstalk DC @ 100 Hz	- 30 dB		
Output impedance	22 Ω		
Minimum load impedance	600 Ω		
Short circuit protection	Yes		
Updating time	1 ms		
Stabilization time	4 ms		
Scale	Range	Counting	Resolution
	0 – 10 V	0 to 30.000	2.59 mV
Scale clearance	4 %		
Over load indication	Yes (typically loads with impedance lower than 500 Ω)		

Notes

Updating time: maximum time between the end of cycle and the output updating.

Stabilization time: maximum time for output signal stabilization with a resistive load greater than or equal to 600 Ω.

Counting: the scale limit may be modified by software, the maximum value is 30000.

Scale clearance: scale clearance allows DA to reaches voltage values out of range to compensate eventual offset errors of the device to be controlled by the analog output.

Current Mode

	DU350, DU351		
Precision	± 0.3% of scale limit @ 25°C ± 0.015% / ºC of scale limit		
Crosstalk DC at 100 Hz	- 30 dB		
Maximum load impedance	600 Ω		
Updating time	1 ms		
Stabilization time	4 ms		
Scale	Range	Counting	Minimum Resolution
	0 – 20 mA	0 to 30.000	5.2 μA
Scale clearance	4 %		
Open loop indication	Yes (typically loads with impedance greater than 650 Ω)		

Notes

Updating time: maximum time between the end of cycle and the output updating.

Stabilization time: maximum time for output signal stabilization with a resistive load lower than or equal to 600 Ω.

Counting: the scale limit may be modified by software, the maximum value is 30000.

Scale clearance: scale clearance allows DA to reaches voltage values out of range to compensate eventual offset errors of the device to be controlled by the analog output.

Fast Counters

	DU350, DU351
Number of counters	Up to 4 32-bit configurable fast counters
Counting modes	**One-way** Increment or decrement **Two-way** A: Increment B: Decrement A: Count B: Direction Square with two counting per period (2x) Square with four counting per period (4 x)
Data format	32-bit unsigned integer
Operation limit	4,294,967,295
Maximum input frequency	40 kHz for Block 0 and 20 kHz for Block 1
Terminal block configuration	Block 0 I00 – Input A (two – way) or Block 0 Counter 0 (one-way mode) I01 – Input B (two – way) or Block 0 Counter 1 (one-way mode) I02 – Configurable input block 0 Block 1 I10 – Input A (two – way) or Block 1 Counter 2 (one-way mode) I11 – Input B (two – way) or Block 1 Counter 3 (one-way mode) I12 – Configurable input block 1
Configurable Parameters	Counting mode Inputs function Outputs function Comparison registers

Local Serial Channel

	DU350, DU351
Physical layer	RS-232
Protocol	MODBUS RTU master and slave, communication with MasterTool IEC programmer and generic protocol
Hardware signs	RTS, CTS, DCD, DTR and DSR
Insulation with logical circuit	No
Connector	RJ45

RS-485 Serial Channel

	DU350, DU351
Physical layer	RS-485
Protocol	MODBUS RTU master and slave and generic protocol
Internal termination	No
Insulation with logical circuit	No
Connector	RJ45

Software Features

	DU350, DU351
Programming language	IL, ST, LD, SFC, FBD and CFC
Online programming	No
Language conversion	Conversion of available language codes
Application memory	256 kbytes
Average memory per IL instructions	1000 instructions each 7 kbytes
Memory for source code download	256 kbytes
I Data type memory	128 bytes
Q Data type memory	128 bytes
M Data type memory	6656 bytes
Global memory	6656 bytes
Retain	1250 bytes non - volatile memory
Number of POUs	300
IHM programmer	Included in the same interface of application developer
Simulator	PLC simulator for application tests without the equipment
Advanced functions	Available libraries for advanced control

Notes

I and Q type data memory: the "No address check" in "Device Settings" is not selected by default. In this case it is only possible to use the DU350/DU351 digital and analog inputs and outputs associated addresses in the application. If this option is selected the entire range may be used.

Global Memory: in this area of 6656 bytes is necessary to use one byte for control, so only 6655 bytes can be declared (the remaining byte is for control).

Software version: the data in the table refer to the available memory from DU350/DU351 firmware 1.10 version.

Compatibility with Other Products

Code	Description
MT8200	MasterTool IEC 1.00 version or above

Notes

Features: Some of the features described in this CT are only available in certain versions of MasterTool IEC and DU350/ DU351 software. For more details see the DU350/DU351 Utilization Manual (MU213100).

Installation

Electrical Installation

DANGER:

RISK OF ELECTRIC SHOCK

This module can work with up to 240 Vac voltages. Special care must be taken during the installation, which should only be done by technical enabled personnel.

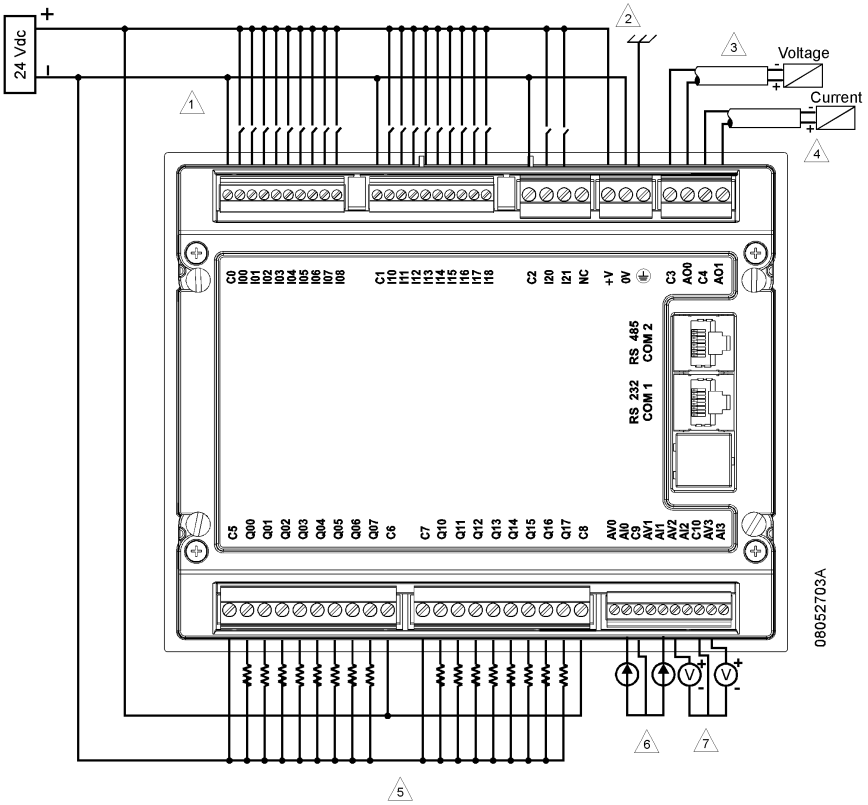
Do not touch on the wiring field with the base when in operation.

ATTENTION:

The device is sensitive to static electricity (ESD). Always touch in a metallic grounded object before handling it.

ATTENTION:

Double-check the connection of the analog signals (AO0, AO1, AV0, AI0, AV1, AI1, AV2, AI2, AV3, and AI3). The incorrect connection of their respective connectors may cause irreversible damage to the product.



Connection example DU350/ DU351

Diagram notes

1 – Typical usage of “sink” digital inputs, C0, C1 and C2 are the common to their respective input group I00 to I08, I10 to I18 and I20 to I21.

2 – 24 V power supply with the 24 V, 0 V and ground protection pins.

3 – Example of an analog output configured for voltage mode output.

4 – Example of an analog output configured for current mode output.

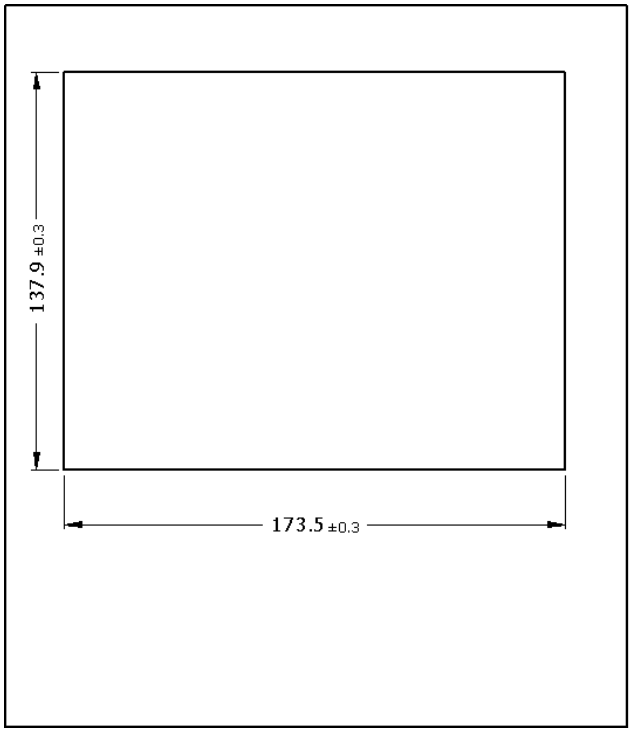
5 – Typical usage of digital output transistor types (DU350) and fast outputs (DU350 and DU351). In order to use the relay digital output (DU351) it is not necessary to connect C5 and C7 pins; but only common, C6 and C8.

6 – Example of two analog inputs configured for current mode input.

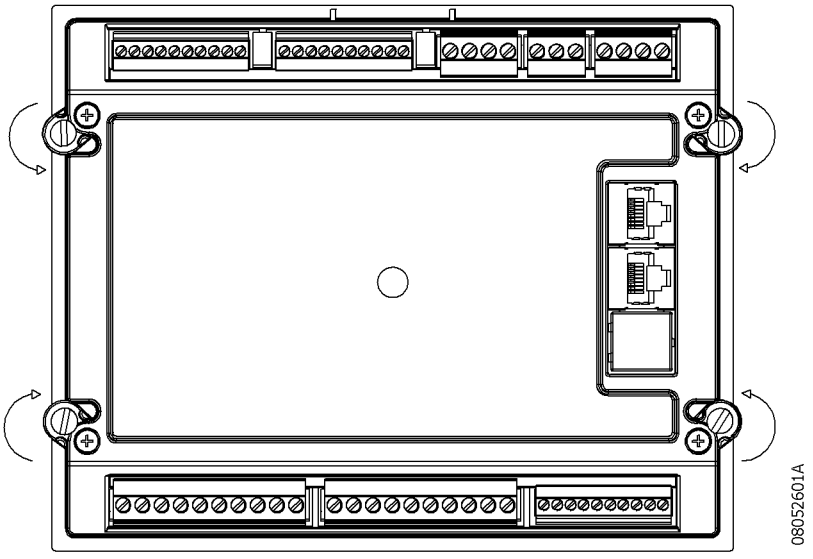
7 – Example of two analog inputs configured for voltage mode input. The connection of a 0 to 10 V signal in a current input pin may cause damage to the product.

Mechanical Assembly

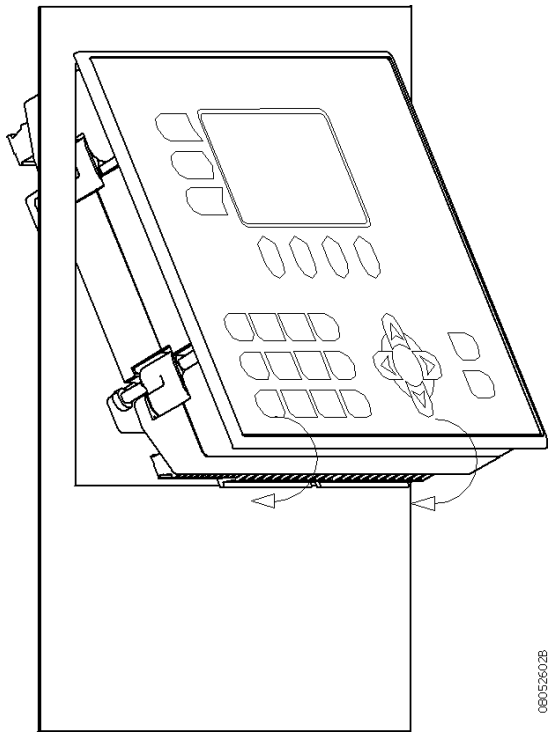
For the correct installation and operation of this product, the panel must be cut according to the following dimensions shown below:



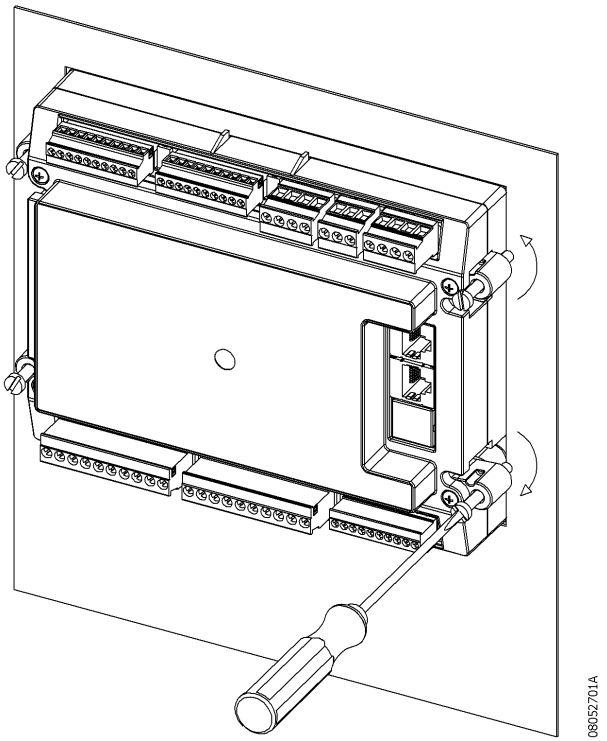
The side tabs setting should be collected for the controller installation in the panel.



The controller must be installed in the panel, docking first the top.



After duly docked, the tabs must be opened (spinning, like described in the following figure) and the fixing bolts shall be tight using a proper tool.



After these steps, the controller is mounted in Panel and you can start the field connection wiring. The terminal blocks located on the back of equipment are identified by interfaces to which they belong. The terminal blocks are of screw type and they are deployable, in order to facilitate the connection. The field wiring must be connected to the equipment without power sourcing, in order to avoid electric shocks. After checking the connections, the equipment can be powered.

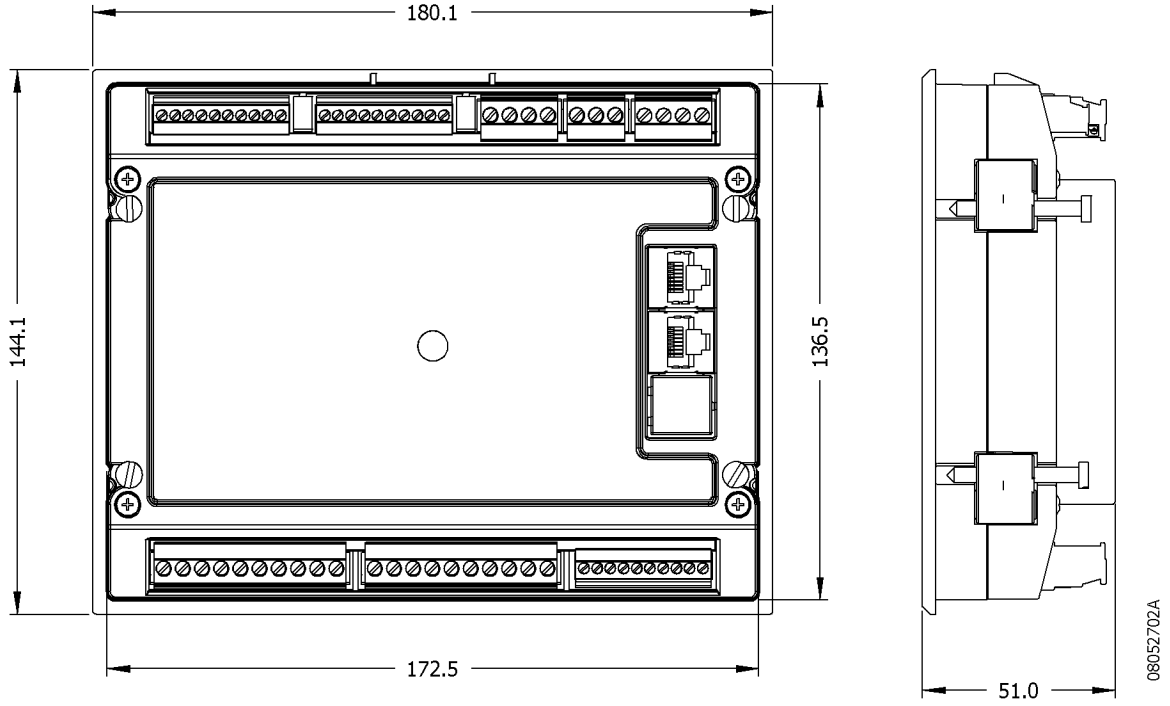
DU350 and DU351 modules have a protective film on the overlay to protect it from damage during transportation and handling on the installation phase. Once the module is installed this film can be removed allowing better visualization of the keyboard and display.

Software Installation

To perform the installation of MasterTool IEC development software, first you have to download the setup file on the Altus site (www.altus.com.br). For more information on the programming installation, see the Utilization Manual (MU299606), or the DU350/DU351 Utilization Manual (MU213100).

Physical Dimensions

Dimensions in mm.



Maintenance

The diagnostic operands are listed in the special operands table, which is available at DU350/DU351 Utilization Manual (MU213100)

Programming

The CPUs DU350 and DU351 PLC-HMI use the IEC 61131 standard languages, which are IL, ST, LD, SFC and FBD. We can separate these languages in textual and graphical. The IL and ST are textual languages and they are similar to Assembly and C, respectively. The LD, SFC and FBD languages are graphical. LD uses the representation of relays and blocks and are similar to relay diagrams; SFC uses the representation of a sequence diagram, making easy the view of the sequence events; and, FBD uses an arrangement of function blocks, allowing show clearly the functions performed on each action.

The programming is performed on the MasterTool IEC interface development. The IDE enables the use of five languages in the same project, thus allowing enjoys the best characteristics of each, resulting in the development of an application robust and easy to understand and maintain.

For more information about programming, see the Utilization Manual (MU299606), the IEC standard (61131-3) or the DU350/ DU351 Utilization Manual (MU213100).

Configuration

The DU350/ DU351 configurable parameters can be accessed via MasterTool IEC programming software.

Possible change settings are related to input and output analog channels, fast inputs/outputs and MODBUS master and slave protocols configuration in communication channels. For more information about the configuration see DU350/ DU351 Utilization Manual (MU213100).

Manuals

For more technical details, configuration, installation and programming of products of Duo series, the following documents should be consulted:

Document code	Description
MU299606	MasterTool IEC Utilization Manual
MU299608	MasterTool IEC Visualization Utilization Manual
MU213100	DU350 / DU351 Utilization Manual