1. INTRODUCTION TO NEWEL3

1.1. INTRODUCTION

NEWEL 3 represents a new generation of control systems for refrigeration installations. As the fruit of close collaboration between DIGITEL and professionals in the refrigeration industry, NEWEL 3 incorporates all the advantages of the NEWEL and NEWEL2 range, well-established on the market since 1990, and delivers numerous improvements in terms of flexibility, functional capability and reliability.

1.2. BASIC CONCEPT

The NEWEL 3 system is comprised of one or more control units, which are completely independent of each other.

The range consists of universal DC24 modules mounted in two different types of housing:

DC24D:	In DIN housing
DC24E:	In a plug-in housing

The DC24 modules will fulfil instrument, monitoring and control functions for the regulating devices concerned (solenoid valve, defrosting system, fans, compressors, etc.).

These modules can assume an extremely wide variety of functions, specifically:

- control functions for cooling units
- management of the electronic expansion valve
- humidity control
- management of compressor units
- management of condensers
- other functions for specific applications (storage of fruits and vegetables, regulation of O_2 – CO_2, etc.)

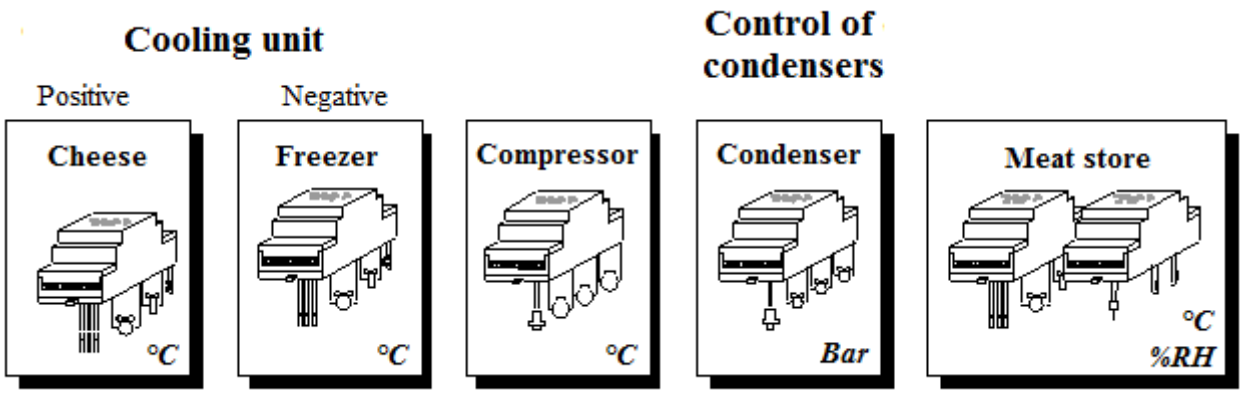


Figure 1.2.1

- **Control of Compressors** **Humidity control**

The module can be programmed using the keys on the front panel of the housing, or using a computer, if the system is equipped with a remote management function. The integral display will indicate the variables, measured by connected probes, and is used for the programming of parameters.

1.3. PRODUCT RANGE

The following table summarizes the functions and characteristics of the various DC24 modules at a glance.

	Ref.	Applications						Characteristics												
		cooling unit							Inputs				Outputs		Supp					
		Positive	Negative	Central management	Hygrometry	In/Outputs	Others	White display	PT1000 /NTC/PTC	0-10V	4-20mA	TOR	Relais	Analogue	230VAC	Terminal plug	BUS interface monitoring	Clock	Pressure transmitter
	DC24E	x	x		x	x	x	x	5	x		2	4		x	x	x	x	
	DC24EE	x	x		x	x	x	x	5	x		2	4		x	x	x	x	x
	DC24D	x	x	x	x	x	x	x	5	x	x	2	4	2	x	x	x	x	
	DC24DE	x	x	x	x	x	x	x	5	x	x	2	4	2	x	x	x	x	x

Figure 1.3.1

The main differences between the two universal modules are summarized in the following table:

DC24E / EE	***DC24D / DE***
The module is embedded into the front panel of a cabinet, incorporated into a display window, etc.	The module is mounted on DIN rails The module may be fitted in a cascade arrangement with other modules to enlarge the in-and-outputs for many applications

1.4. MODULE DISPLAY

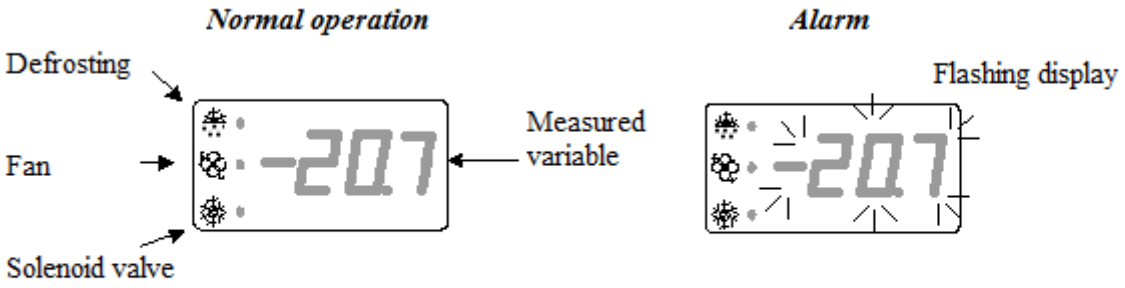


Figure 1.4.1

We suggest mounting the modules the way the display will be seen straight or from below. The best result of the display is obtained in the following angles.

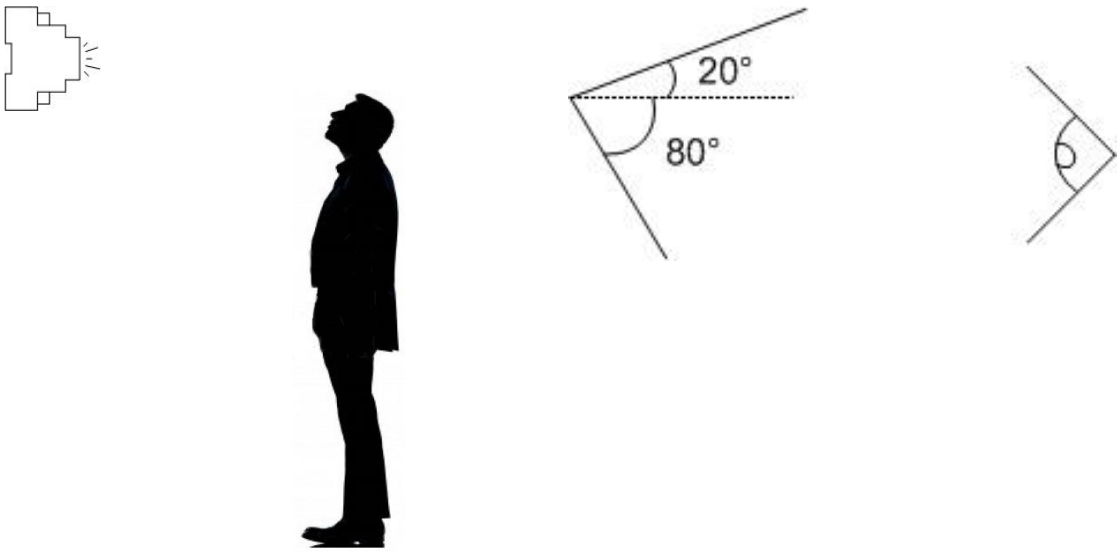


Figure 1.4.2

1.5. PROGRAMMING OF PARAMETERS USING KEYS

Figure 1.5.1 shows an example of the programming diagram applied for the parameterization of modules using the programming keys. The appropriate version of this diagram will be found in the corresponding user manual for the mode of operation which is to be assigned to the programmed module. For example, for the parameterization of a module for the management of a cooling unit, the diagram found in the chapter **3 Management of cooling units** should be applied.

	Symbol	Access level	Function	Comment	Min. value	Max. value	User value
	PAS	0	Password		0	999	
Ambient temperature	t1	1	Setpoint (°C)		-999	999	
	t2	2	Delta (°C). The device can regulate between temperatures t1 and t1+t2		0	999	
	t3	3	Lower setting limit of setpoint (°C)		-999	999	
	t4	3	Upper setting limit of setpoint (°C)		-999	999	
	t5	2	Lower alarm limit (°C)		-999	999	
	t6	2	Upper alarm limit (°C)		-999	999	
	t7	2	Alarm delay (min)		0	999	
	t8	2	Setpoint offset (°C)		-999	999	
	t9	2	Start of setpoint offset (HH:M)		0	240	
	t10	2	End of setpoint offset (HH:M)		0	240	
	t11	3	Minimum operating time (min)		0	999	
	t12	3	Minimum resting time (min)		0	999	
Fans	v1	2	Operation of fan *0 = tripped during defrosting* *1 = continuously in-service* *2 = controlled by valve* *3 = controlled by evaporator probe*		0	3	
	v2	2	Fan start-up temperature (°C)	v1 = 3	-999	999	
	v3	2	Fan trip temperature (°C)	v1 = 3	-999	999	
	v4	3	Analogue output – temperature corresponding to 0% (°C)		-999	999	
	v5	3	Analogue output – temperature corresponding to 100% (°C)		-999	999	
Contacts C1, C2	F1	3	Operation of contact C1 *0 = alarm upon closing 3 = none* *1 = alarm upon opening* *4 = setpoint offset upon closing* *2 = shutdown of unit 5 = door contact*		0	5	
	F2	2	Alarm delay (min)	F1 = 0, 1, 5	0	999	
	F3	2	*0 = deactivated* *1 – 99.9 = delay in the start-up of the compressor/solenoid valve after door closure*		0	999	

Parameter applied only if v1 = 3

Parameter applied if F1 = 0 or 1 or 5

Figure 1.5.1

1.5.1. PROGRAMMING OF PARAMETERS

- To access parameterization mode, press on  for 3 seconds.
- The display will read PAS, then 0. This means that you are required to enter a password (modules are delivered with all three passwords set to 0)
    - There are three levels of password: the first level, for users, will allow the modification of the setpoint and clock setting, the second level – which is intended for the use of the operating engineer – will provide access to virtually all functions, while the third level, which is reserved for the installer, will allow the complete configuration of the installation.
- Enter your password by pressing on  to increase its value and  to decrease its value, then on  to validate. If the password is accepted, the display will indicate the symbol of the first parameter for 1 second, then its value. If the password is incorrect, repeat the entry operation.
- Press on  to increase and  to decrease the value of a parameter
    - To change the value more rapidly, hold down one of these keys for 3 seconds or more. The display will scroll with increasing speed. As the desired value is approached, release the key, then press a few more times, but briefly, to achieve the exact value.
- Press on  to validate the parameter concerned, and then move on to the next parameter.
- To move on to the next parameter without validating, press on  . The display will indicate the symbol of the next parameter for 1 second, then its value.
- To return to the previous parameter, hold down  then press on  until the required parameter is shown.
- Parameters with similar functions will be combined in groups described as menus. Symbols for parameters in the same menu will have the same initial letter.

  To move from one menu to another, press on  for 3 seconds. The various menus will scroll down. Release the key once you have reached the required menu.
- To save changes and quit programming mode, press on  . **If no saving operation is completed, parameters will be restored to their previous values.**
- If no key is pressed for five minutes, the device will automatically return to normal mode, will delete all changes and restore the previous values of parameters.

Special operations:

- In “cooling unit” mode:
  - It is possible to initiate defrosting by means of an override, by pressing on  and  keys simultaneously for 5 seconds.
  - By pressing  and  keys simultaneously for 5 seconds it is possible to force the “Day” mode (switch on the lights and mount the curtains)
  - Pressing  and  keys simultaneously for 5 seconds will cancel the previously forced “Day” mode.
- It is also possible to acknowledge an alarm by pressing on  for 3 seconds.
- By pressing the  and  , keys simultaneously, you will access the programming mode for the basic configuration (see chapter **1.5.2**)

Temporary display

During normal operation, the temporary display of various measured variables and the status of various inputs will be possible.

In “cooling unit” mode, pressing briefly on the  key will display the ambient temperature “tA”, while a second depression will call up the evaporator temperature “tb”, then the probe “tC”, the status of the contact “C1” and the status of the contact “C2”. The variable selected will be displayed for 1 minute, and then the display will return to its normal status, determined by the value of the parameter **[r2]**.

On the DC24DE and DI24EE modules (electronic expansion valve), it is also possible to display “P” – the suction pressure, “S” – overheat, and “o” – degree of opening of the electronic expansion valve.

In “pressure regulation” mode, successive depressions of the  key will call up the display of the following values: “Pb” – pressure in bar, “Pt” – pressure in °C, “S1” – status of safety chain n° 1, “S2” – status of safety chain n° 2, “S3” – status of safety chain n° 3, “C1” – status of contact C1, “C” – status of contact C2.

1.5.2. PROGRAMMING OF BASIC CONFIGURATION

When a module is brought into service, the basic configuration for that module (parameter **[r1]**) must firstly be configured using the method described below. This configuration is comprised of a number of parameters, which will determine the subsequent operation of the module. Specifically, this configuration will determine whether the module is to function as a regulating device for cooling units, or as a regulating device for a condenser, compressors, humidity, etc.

Once these variables have been correctly programmed, active parameters in this mode will be programmed by default, and the module will be operational thereafter. **Attention!!! Before connecting the inputs and outputs, make sure the module is operating normally and that all the parameters have values that match to the configuration, the sensor and probe types connected to it. See chapter 1.9 Important remarks.**

- To access parameterization mode for the basic configuration, hold down the  and  keys simultaneously for 3 seconds.
- The remainder of the programming method is identical to that described above.
- To save changes and quit parameterization mode, press on  for 3 seconds.

The following example shows a compressor regulation function with a display in °C and a refrigerant R404A.

Symbol	Access level	Function	Comment	Min. value	Max. value	Variable to be programmed
PAS	0	Password		0	999	
R1	3	Operating mode *0 = cooling unit* ***1 = Compressor management*** *2 = Universal regulation 3 = Monitoring* *4 = Management of evaporators 2, 3, etc.*		0	4	1
cF1	3	*Slave adresse* *0 = Pilote compressor 1-3 1 = compressor 4 – 6* *2 = compressor 7 – 9 3 = compressor 10 - 12*	r1 = 1	0	3	0
cF2	3	Type of regulation ***0 = low pressure*** *1 = high pressure*	r1 = 1	0	1	0
cF3	3	Display unit *0 = bar* ***1 = °C***	r1 = 1	0	1	1
cF4	3	Refrigerant *1 = R12 2 = R22 3 = R134A 4 = R502 5 = R500* *6 = MP39 7 = HP80* ***8 = R404A*** *9 = R717 (NH3)* *10 = chilled water 11 = R407 (fluid) 12 = R407 (gas/fluid) 13 = R23*	r1 = 1	1	13	8

Figure 1.5.2

•To access the functional parameterization mode, hold down the  and  keys simultaneously for 3 seconds.

- Enter password and press on  . This will call up the operating mode (parameter **[r1]**)
- For compressor management, r1 = 1. Press on 
- This will call up the option for compressors (low pressure) or fans (high pressure). For compressors, cF2 = 0. Press on 
- This will call up the display options. For a display in °C, cF3 = 1. Press on 
- The refrigerant is the last option. For R404A, cF4 = 8
- Exit programming mode by pressing on  for 3 seconds.

Our module will then be ready for operation with non-default parameters.

If no key is pressed in programming mode for five minutes, the device will automatically return to normal mode, will delete all changes and restore the previous values of parameters.

1.6. PASSWORDS

NEWEL3 has passwords at three hierarchical levels. The first level authorizes access to an extremely limited number of parameters which can be modified by the owner of the installation who, in general, will not have the necessary expertise for the modification of sensitive data. The second level password will authorize access to all parameters, with the exception of the level 3 password, and will be used by qualified engineers operating on the installation. The option for the changing of passwords on the first and second levels will be available. The level three password authorizes access to all parameters. In principle, this level of password will only be used for the retrieval or modification of a second level password, in case of the loss or inadvertent modification of the latter.

Where a password is set to 0000, access to the corresponding hierarchical level will be unrestricted

1.7. MONITORING FUNCTIONS

The device will undertake the continuous monitoring of the installation, and will trigger an alarm in case of the detection of an anomaly. The codes, dates and times of the 5 most recent anomalies will be stored as parameters **[A1C]**, **[A1d]**, **[A1b]**, **[A1H]**, **[A1M]**, **[A2C]**, etc. A schedule of alarm codes and their meanings is included at the end of the programming diagram.

By pressing on the  key for 3 seconds, the alarm will be acknowledged and the alarm contact will open..

1.8. REMOTE MONITORING, REMOTE MANAGEMENT

NEWEL3 may be connected to a remote monitoring system via a DC58 central unit. A device of this type will allow the installer, or any other authorized person, to retrieve information from modules remotely via an internet TCP connection. Communications are managed by a computer (IBM-compatible PC) equipped with “TelesWin” software, which is sold by our company. Full data can be accessed on the current status of the installation (temperatures, humidity, status of inputs and outputs). It will also be possible to undertake the remote modification of all parameters, to instruct an override defrost cycle, shutdown or override operation of a unit, etc.

The central remote monitoring unit also has the capability for the cyclical memorization of all key data concerning the installation (temperatures, humidity, status of inputs and outputs, etc.). The frequency of recording is programmable.

In case of any anomaly or failure, the central unit will automatically connect to your computer, in order to allow the nature of the fault concerned to be displayed on screen. The priority level of each anomaly will be programmable (see chapter **12. Remote Monitoring & remote management**).

600 modules may be connected to a single remote monitoring unit. Further details of remote management may be obtained in chapter **12. Remote Monitoring & remote management**

1.8.1. WEEKLY SCHEDULE

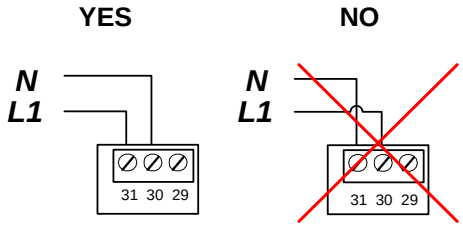
An installation with remote monitoring may be equipped with the “Weekly schedule” option (see chapter **12 Remote Monitoring & remote management**).

For installations of the supermarket type, this option will allow the programming of the weekly cycle of store openings and closures, together with the automatic modification of the operation of the installation during periods of closure. These modifications will only affect slave units on which the parameter “Management of unit by weekly schedule” has been set to “Yes” (in the “Calendar” menu).

Depending upon the mode of operation of slave units, modifications to the functioning of the latter during hours of closure may take various forms. These may involve the complete shutdown of the unit, a set point offset, lighting and night blind controls, modification to the processing of alarms, etc. (see user manual for the corresponding mode of operation).

1.9. IMPORTANT REMARKS

Do not ever invert L1 and N on the supply of the DC24 modules. See following drawing:



The modules are delivered with factory settings set for the inactive “cooling unit” mode. The display shows “OFF”. Every input and output is inactivated. Before connecting the module and activating it, every parameter shall be set for the planned configuration and use. Wrong parameters can cause serious dysfunction and deal important damage to the installation

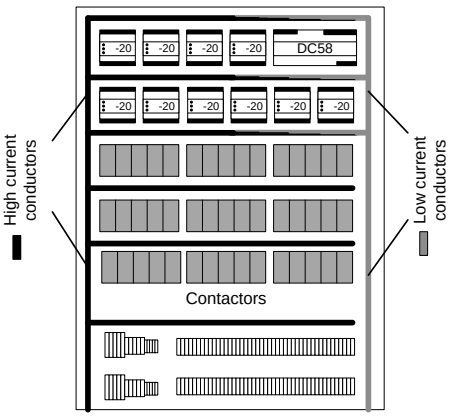
Devices should not be fitted to elements which are affected by strong vibrations.¨

Devices should not be positioned in close proximity to a strong source of electromagnetic fields and interference (power cables, speed variator, etc.).

The device must not be exposed to moisture.

The contacts C1 and C2, together with safety contacts for the management of compressors, are zero-potential contacts. No exterior voltage must be applied to these inputs.

Arrangement of components in electrical cabinet



All operations (connection of wires, plugging and unplugging of connectors, etc.) must be completed with the device isolated from supply. All operations must be undertaken by qualified personnel.

Particular attention must be paid to the protection of the communication bus. This must not be exposed to overvoltage associated with connection errors or any induction associated with the proximity of a high current conductor.

For the connection of the communication bus, we recommend a cable of the CAT5 type, or a special RS485 bus cable. In all cases, a single pair of twisted conductors should be used. Any other wires should be left unconnected.

The voltage applied to relay contacts during insulation tests must not exceed 1000 V.

☺ All electrical connections must be checked prior to any connection to supply. Under no circumstances must voltages exceed the values specified in the technical characteristics.

☺ In order to ensure compliance with protection standards for electromagnetic interference and extend the service life of relay contacts, it is recommended that RC filters should be installed in parallel with all inductive loads (coils of contactors, solenoid valves, etc.). Connections between the RC filter and the coil concerned should be as short as possible.

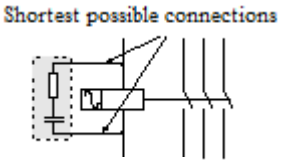


Figure 1.9.2

☺ We would recommend the connection of probes and sensors using shielded cables. Shielding must be connected to ground on the electric switchboard side, and unconnected at the other end. Severe electromagnetic interference may influence measurements and result in substantial measuring errors.

☺ Devices must be cleaned using a dry cloth.

☺ Any use of devices which is not compliant with the provisions of the present document may result in the poor operation or destruction of the devices concerned, and will invalidate the guarantee.

💣 No objects (screwdrivers etc.) must be inserted into the ventilation slots. The circuit may be damaged as a result, and may no longer operate correctly.

😐 Plans, drawings, descriptions and circuit diagrams must not be reproduced or disclosed to third parties without the written permission of DIGITEL SA, who shall retain ownership thereof. Sketches of circuit arrangements will be classified as drafts, for which we can assume no liability.

😐 General circuit diagrams prepared by ourselves will be adapted by the concession-holder concerned in accordance with local regulations. Any deterioration of our equipment associated with non-regulation use will be excluded from the terms of the guarantee, and we can accept no liability for any resulting damage to equipment which is connected to our modules. We can accept no liability for any loss or damage associated with the breakdown of devices

1.10. TECHNICAL DATA

		DC24D/DE	DC24E/EE
Power supply	Supply voltage	110-250 V ac., 50-60 Hz	110-250 V ac., 50-60 Hz
	Maximum input power	4W	3W
Protection rating		1	1
Contamination rating		2	2
Overvoltage category		II	II
Conditions of use	Temperature	0-40°C	0-40°C
	Humidity	0-80% (without condensation)	0-80% (without condensation)
Breaking capacity of relays outputs.-(20-21, 22-23, 24-25 on DC24D & DC24E)	Resistive load	10A 250 V ac.	3A 250 V ac.
	Inductive load	6A 250 V ac.	3A 250 V ac.
Breaking capacity of triacs outputs (20-21on DC24DE & DC24EE)	Resistive load	1A 250 V ac.	1A 250 V ac.
	Inductive load	1A 250 V ac.	1A 250 V ac.
Minimal current of triac output (20-21 on DC24DE & DC24EE		11mA	11mA
Clock	Reserve operating margin	4 days	4 days
Input 4-20mA	Range of measurement	4 – 20 mA	4 – 20 mA
Input 0-10V	Range of measurement	0 – 10 V	0 – 10 V

Figure 1.10.1

Available temperature probe type

Type	Reference	Range of measurement
PT1000	DI-S1	-80 to +80°C
PT1000	DI-S1E	-100 to +160°C
NTC	10K/25°C	-35 to +25°C
NTC	L-243	-38 to +25°C
PTC	KTY81	-55 to +90°C

Figure 1.10.2

1.11. VIEW OF HOUSING AND PERFORATION PLANE

1.11.1. DC24D

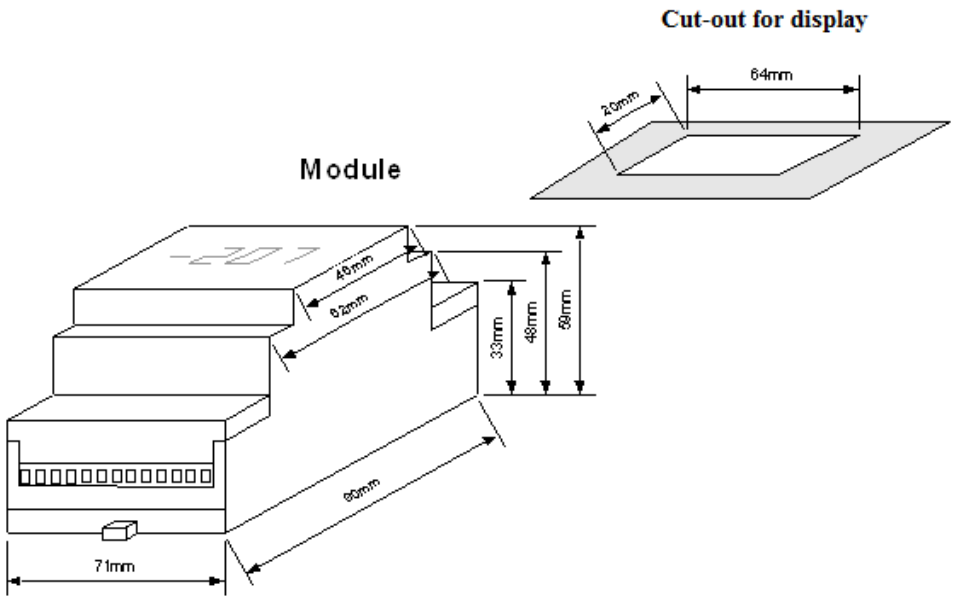


Figure 1.11.1

1.11.2. DC24E

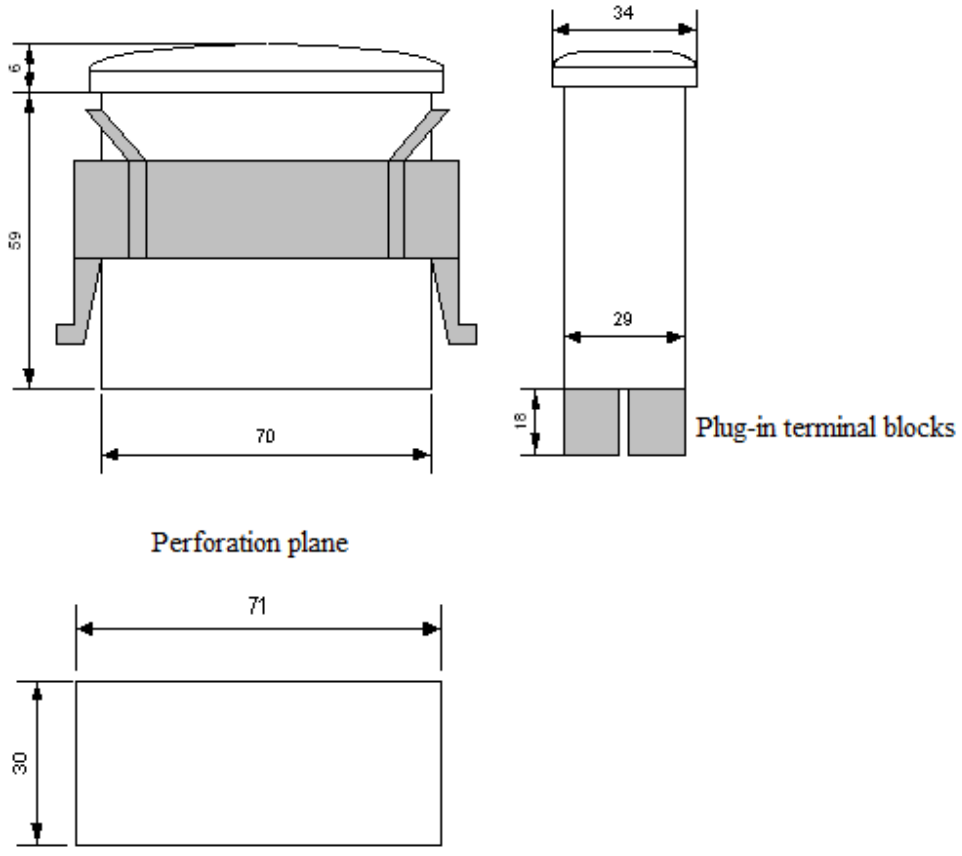


Figure 1.11.2

1.11.3. DC10A

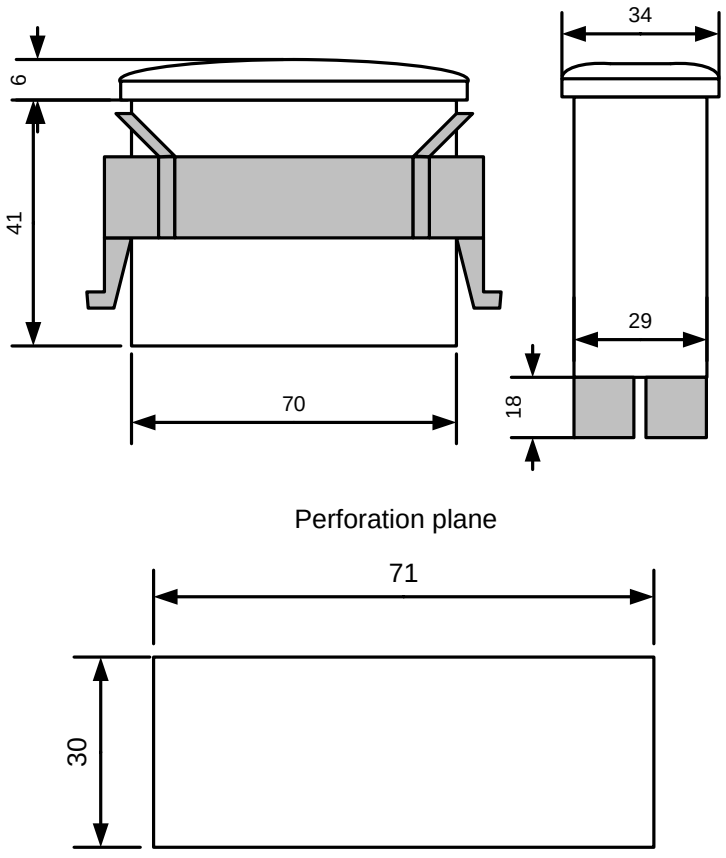


Figure 1.11.3