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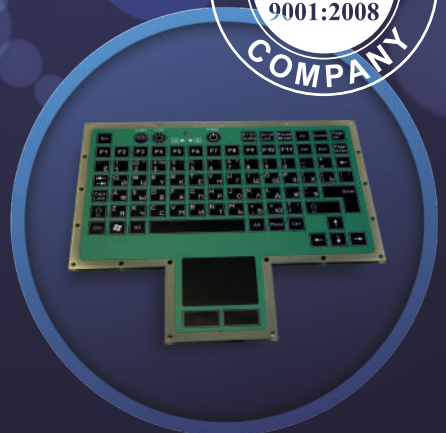
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Contactmodule

NPP «Contactmodule» Ltd.



ABOUT THE ENTERPRISE

«NPP «Contactmodule» Ltd. develop and produce, on the basis of its own manufacturing area electronic input and data displaying devices, control systems for diverse manufacturing sectors, instrument making, vehicles, energetics, medicine and other spheres of application, where high demands of capability to severe environment exposure are made.

The enterprise has its own design-engineering service, equipped by modern office machines and latest achievements in the sphere of designing application programs, which allows creating new and original products according to the highest customers' demands. The manufacture process includes an employment of efficient automatic and semiautomatic equipment, which allows providing an excellent quality and moderate price. Only high-quality materials and kitting from worldwide known producers are used in the production.

THE DEVELOPMENT AND PRODUCTION OF:

- **control systems**
- **“industrial keyboards”**
- **(special purpose keyboards) IP54–IP68**
- **vandal protected keyboards**
- **industrial monitors (T = -55 C + 75 C)**
- **indication and control panels for vehicles**
- **decorative panels**
- **membrane keyboards**
- **touch keyboards**
- **inductive sensors**
- **“Hall effect” sensors**



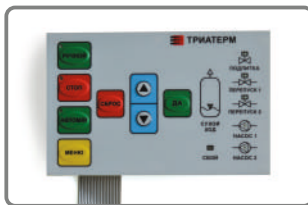
CONTROL SYSTEMS AND “INDUSTRIAL KEYBOARDS”

CONTROL SYSTEMS

Processing equipment control systems, vehicles' units control systems, power and other control systems formed by the customer's technical demands. The interface and equipment connection protocol are decided on the customer's demands. (e.g. RS-232, RS-485, PS/2, USB, CAN and etc.).

“Industrial keyboards” are multilayer membrane control panels, keyboards for several environment applications. “Industrial keyboard” – is the keyboard with the special structure and data displaying elements, which provides frontal surface hermetization. These keyboards are realized on the base of glass-fiber laminate or/and polyimide printed boards with copper conductors and termination pads, covered with 6 microns of galvanic nickel and 3 microns of gold.

The switch elements – are the membranes (metal dome) made from stainless steel, which provides up to 5 000 000 cycles of operation and tactile click. These membranes are locked in foil-board to prevent displacements resulted from vibrations and impact loads.



keyboards provide hermetization from IP54 to IP68 depending on the technical performance.

On the reverse side of the “industrial keyboard”, if



necessary, is carried out the installation of:

- LEDs of indication (is possible in SMD execution and on the front side under the plate),
- radioelements of electronic circuit controllers, that provides the maintenance of keys, LED's backlight and keyboard indication, and also of controllers, which operates customer's execution unit. The interface and equipment connection protocol are decided on the customer's demands. (e.g. RS-232, RS-485, PS/2, USB, CAN and etc.).
- connectors and/or cables
- fixture elements (threaded studs, bushes), e.g. for fastening of LCD or shelf-type constructions of additional electronic modules, including plug-in connector switching.

The frontal layer of “industrial keyboard” is covered by the images of keys, characters images and etc., which won't wipe off the whole period of service with the help of the so called “paint-under-a-film” method, optically transparent windows for indicators are realized (also frosted and tinted in the suitable color), and the ornamental forming of keys is carried out (see Forming types).

“Industrial keyboard” is the self-carried construction, which serves as a front instrumental panel. These



Technical features of the “Industrial keyboards”

Pressure force, gr.	80 ... 600	“industrial keyboards” thickness, mm	0.9 ...6
Stroke length, mm.	0,15... 0,4	Switching current, milliampere	0,05 ...100
Operating temperatre, C°	-50 ... +75	Switching voltage, volt	0,5 ... 40
Mean lifetime, years	10	Switching power, watt	< 4,8
Warranty life, presses	5 x 10 ⁶	Contact resistance with the current of 100 milliampere, ohm	0,2

CONTROL PANELS WITH NIGHT AND SMART BACKLIGHT AND VANDAL PROTECTED KEYBOARDS

CONTROL PANELS WITH NIGHT AND SMART BACKLIGHT

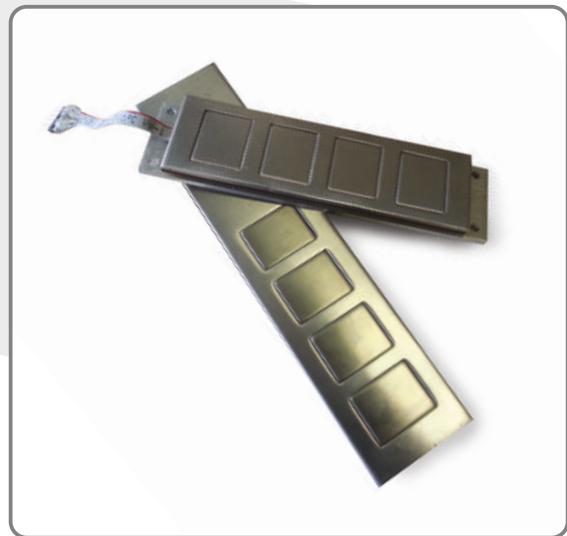
Control panels with night and smart backlight with one-color or multicolor SMD light-emitting economic diodes LEDs are the panels that provide an even illumination across the entire keyboard characters or across its definite parts. **Smart backlight** can provide up to 5 different colors for each zone. Pressing the button you can change the color of the key glow for visual perception of the key operation, and color indication of the pressed key.

For easy work in scanty outer lighting the keyboards with the "night backlight" are used. The use of LEDs for lightening allows to provide great reliability and low energy consumption.



VANDAL PROTECTED KEYBOARDS

The frontal layer is made from stainless steel by thickness of 1,5 – 2,0 mm, and is **stable for mechanical, chemical effect and open fire heating**. Keys have a catch



device (protection from switching membranes "jacking". The form of keys and characters is chosen by a customer. The characters are embossed by laser or milling engraving with colored enamel filling. Switching membranes are installed fully hermetic. The keyboard frontal side is made to order: either glossy or textured.

Technical features

Pressure force, gr.	80 ... 600	Control panels, mm	0,9 ...6
Stroke length, mm.	0,15... 0,4	Switching current, milliampere	0,05 ...100
Operating temperatre, C°	-50 ... +75	Switching voltage, volt	0,5 ... 40
Mean lifetime,years	10	Switching power, watt	< 4,8
Warranty life, presses	5 x 10 ⁶	Contact resistance with the current of 100 milliampere, ohm	0,2

INDUSTRIAL MONITORS

Special-purpose monitors are oriented for work at severe environment - extreme temperatures, high vibrations, impact loads and humidity. These monitors can be used in different spheres from industrial manufacturing to military-industrial complex. While working in low temperature conditions realizes (-50C) a special heating system of matrix, providing the entry time no more than 5 minutes. All monitors are produced **according to the customer's technical requirements.**

Technical features

Display size*	7"-24"	Power watt, up to	50-400 (with heating)
Screen format	16:9;4:3	Operating temperature, °C	-55 +75
Installation option*	Desktop, wall, embedded	Degree of protection *	IP 65
Brightness, candela /square meter *	Up to 1000	Time for ready,min	5(at a temperature of -50 °C)
Contrast*	From 900:1	Impact loads, g	Up to 20
Palette *	16 000 000	Relative air humidity, %	100 (at a temperature of +35 °C)
Physical definition *	1024x768 1920x1080	Mean time between failures,ths. hours	Up to 100
Interface*	VGA, LVDS	Touchscreen type	Resistive,capacitive
Supply voltage, volt	11...36	Mass, kg	From 2 up to 20

* According to the customer's demand parametric variations can be applied



INDICATION AND CONTROL PANELS FOR VEHICLES

Specialized control panels for use in cars, buses, trolleybuses, trams, trains, airplanes and other vehicles.

According to the customer's request such control panels can be equipped with off buttons, LED signal panel of execution units and alarm messages indication, indicating and/or digital indication devices and displays. Control panels can be provided with appropriate sensors and execution units, if necessary.

For easy work in scanty outer lighting **the control panels with "night backlight"** are offered.



These control panels may be equipped by the **built-in controllers** for the realization of work in the required interface, e.g. (CAN), which allows

to provide the management of electro-, pneumo- and hydro- vehicles systems. Controllers allow to represent the status of the executable functions, alarm and other messages on the built-in displays and on the backup multi-colored light panels (including invisible signal mnemonic symbols), and provides sound\voice backup of warning and alarm messages.

By using our technologies it is possible to realize end-to-end designer solution of the driver's workplace without restrictions in form, size and color of control keys and indication elements.

Technical features of indication and control panels for vehicles:

Pressure force, gr.	80 ... 600	Warranty life, presses	5 x 10 ⁶
Stroke length, mm.	0,4 - 0,6	Switching current, ampere	до 20
Operating temperature, C°	-50 ... +65	Supply voltage, volt	12 или 24
Mean lifetime, years	10	Backlight brightness control	плавная/дискретная

MEMBRANE KEYBOARDS ON THE BASIS OF FLEXIBLE CIRCUIT BOARD, DECORATIVE PANELS, SCALES, SENSORS

MEMBRANE KEYBOARDS ON THE BASIS OF FLEXIBLE CIRCUIT BOARD



Membrane keyboards on the basis of flexible circuit board are realized on the flexible circuit boards on the basis of polyester film by thickness of 0.125-0,150 mm. **Conductors on the flexible bottom layer are formed by the two main methods:**

1) screen printing of conducting inks with graphite, nickel or silver fillers or with their combinations in the capacity of the conducting material. Circuit resistance up to 300 ohm.

2) conductors etching of the circuit board on the lamination to polyester or polyamide film to copper foil with the following local galvanic nickel-plating of the contact areas at the places of membranes' installation. Tactile effect on the membrane keyboards is reached at the expense of frontal plate's film forming or at the expense of the cast-in switching metallic membranes installation.

Technical features of the membrane keyboards

Pressure force, gr.	100... 400
Stroke length, mm.	0,15... 0,4
Mean lifetime, years	3
Warranty life, presses	1 x 10 ⁶
Membrane keyboard thickness, mm	<1,2
Switching current, milliamperere	0,05 ...100
Switching voltage, volt	0,5 ... 40
Contact resistance with the current of 100 milliamperere, ohm	Up to 300

FORMING TYPES:



DECORATIVE PANELS, SCALES, DIAL

Decorative panels are the items on the polycarbonate or polyether film which are manufactured similarly to frontal plates of panels (see above), with the embossed glue layer on the reverse side, containing defensive protector. Very often you can meet such decorative panels as instrument dials, heliofilters, which can be realized with turning color images when the «night backlight» is switched on, and also with invisible inscriptions and images, also incoming when the backlight is on.



INDUCTIVE SENSORS

Inductive sensors are contactless sensors designed for controlling metallic objects. Inductive sensors are used in different spheres of industry: machine-tool construction, vehicle industry etc.

“HALL EFFECT” SENSORS

“Hall effect” sensors are made to control rotation and the angle of rotation.

