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1. APPLICATION

The UNICONT PJK-1□□-4 is a universal interface module that can be controlled via HART or MODBUS protocol through an RS485 interface, and (depending on type) provides relay(s) and/or 4...20 mA current output(s).

The device is intelligent, the internal functions and services can be set with the help of a communication protocol: the transmitter outputs can be scaled. The error detection function can be switched on and off. The state, in which a given output unit should be when an error occurs, can also be set. The device can be used with Nivelco's **Multicont PR□-1□□-□** units as an output extension module, and also as a peripheral device for PLC or PC controlled process control systems.

2. TECHNICAL DATA

2.1 GENERAL DATA

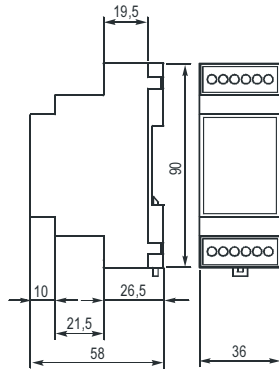
| TYPE | PJK-1□□-4 |
|-----------------------|---|
| Power supply | 24VDC±10% |
| Current consumption | (10 mA + N _{Relay} X 11mA + N _{current generator} X 25 mA) ±10% |
| Ambient temperature | -20 °C ... +50 °C |
| Electrical connection | max. 2.5 mm ² twisted, max. 4 mm ² solid cable |
| Mechanical connection | DIN EN 60715 rail |
| Ingress protection | IP 20 |
| Weight | ≈ 0.11 kg |

N: number of outputs of a given type of output units

2.2 TYPE SPECIFIC DATA

| TYPE (A) | PJK-102-4 | | PJK-111-4 | | PJK-110-4 | | PJK-120-4 | |
|-------------------------------------|--|---|--|---|--|---|--|---|
| | B | C | B | C | B | C | B | C |
| OUTPUT UNITS | [Relay symbols] | | [Relay symbols] | | [Relay symbols] | | [Relay symbols] | |
| Relay | 1 x SPDT | | 1 x SPDT | | 1 x SPDT | | 1 x SPDT | |
| - Output | 250 V AC, 8 A, AC1 | | 250 V AC, 8 A, AC1 | | 250 V AC, 8 A, AC1 | | 250 V AC, 8 A, AC1 | |
| - Rating | 2500 V 50 Hz | | 2500 V 50 Hz | | 2500 V 50 Hz | | 2500 V 50 Hz | |
| - Insulation voltage | 10 ⁵ / 2 x 10 ⁶ switches | | 10 ⁵ / 2 x 10 ⁶ switches | | 10 ⁵ / 2 x 10 ⁶ switches | | 10 ⁵ / 2 x 10 ⁶ switches | |
| - Electrical / Mechanical life span | 0.1..25,5s | | 0.1..25,5s | | 0.1..25,5s | | 0.1..25,5s | |
| - Pulse width in pulse mode | 3601 mA...21.999 mA | | 3601 mA...21.999 mA | | 3601 mA...21.999 mA | | 3601 mA...21.999 mA | |
| - Linear range | ≤ 3.6 mA or ≥ 22 mA | | ≤ 3.6 mA or ≥ 22 mA | | ≤ 3.6 mA or ≥ 22 mA | | ≤ 3.6 mA or ≥ 22 mA | |
| - Error indication | 14 bit | | 14 bit | | 14 bit | | 14 bit | |
| - Resolution | 40 μA | | 40 μA | | 40 μA | | 40 μA | |
| - Accuracy | max. 15 μA / 10°C | | max. 15 μA / 10°C | | max. 15 μA / 10°C | | max. 15 μA / 10°C | |
| - Temperature dependence | | | | | | | | |

2.4 DIMENSIONS



2.5 ORDER CODE

P J K - 1 □ □ - 4

| CURRENT OUTPUT | CODE | RELAY | CODE |
|----------------|------|---------|------|
| - | 0 | - | 0 |
| 1x 4-20mA | 1 | 1x SPDT | 1 |
| 2x 4-20mA | 2 | 2x SPDT | 2 |

3. MOUNTING

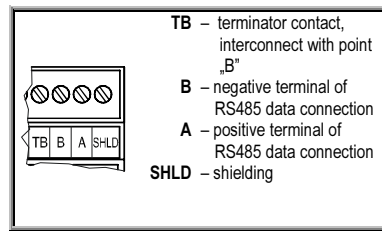
The PJK-1□□-□ device can be mounted on a DIN EN 60715 rail.

4. ELECTRICAL CONNECTION

4.1 ELECTRICAL CONNECTIONS OF POWER SUPPLY AND OUTPUTS

| POWER SUPPLY | RELAYS | CURRENT GENERATORS |
|--|---|--|
| | | |
| - , + Terminals of the 24V power supply. Make sure that the wiring is done with correct polarity! | De-energised relay: C – common contact NO – normally open contact NC – normally closed contact | - – negative current output + – positive current output |

4.2 RS485 COMMUNICATION TERMINALS

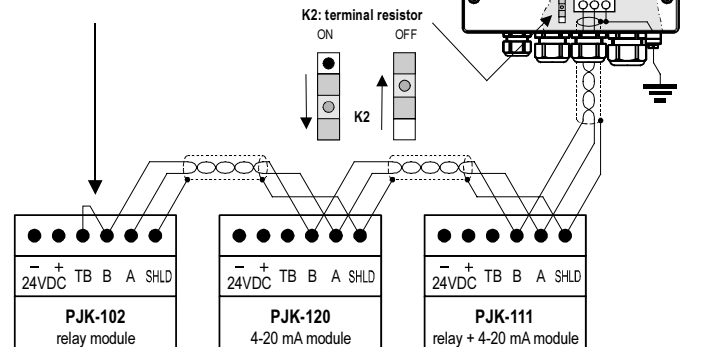


The Universal Interface Modules should be connected one after another to one cable pair. Star topology is not allowed. Max. cable length is 1000 m, but in this case a shielded twisted cable pair (STP – Shielded Twisted Pair) should be used. Max. cable capacity should be less than 100 pF/m. All of the Universal Interface Modules in one system should have different addresses (0...31), see: 5.1.2.

Wiring example when using a MultiCONT:

Connection with shielded twisted pair cable, shielding is grounded at one point on the MultiCONT side.

The terminal resistor is connected to the two farthest points of the cable. (TB and B contacts are connected in PJK 100; and on the MultiCONT the K2 terminal resistor, located next to the terminals, is switched on.)



5. INSTALLATION, SETTING UP AND PROGRAMMING

5.1. PREPARATION

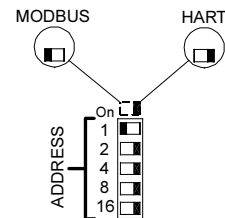
5.1.1 CHOOSING A COMMUNICATION PROTOCOL

Open the housing via the four snap-on clips to access the DIP switch for protocol selection. DEFAULT SETTING: HART

5.1.2 SETTING THE DEVICE ADDRESS

A communication line can contain max. 32 Universal Interface Modules. These modules should have different addresses.

Set the address with the „ADDRESS” DIP switches (0...31), on the front panel of the device. Settings will take effect when the unit is switched on again!



Example for setting the address:
4+8=12

5.2. WIRING

See: 2. Technical Data and 4. Electrical connection

5.3. INSTALLATION

5.3.1 POWER ON AND SELF TEST

After correctly wiring and switching the device on, it runs a few self tests whose results are shown with LED indications.

| SEQUENCE OF SELF TESTS | | 'COM.' LED-s | | 'STATUS' LED-s | |
|------------------------|--|--------------------------|--------------------------|--|------|
| | | 1. | 2. | 1. | 2. |
| 1. | Test of red LED-s: | Red | | Red | |
| 2. | Test of green LED-s: | Green | | Green | |
| 3. | DIP switch test: | Blinking green | Dark | Dark | Dark |
| | result: | Green: OK. Red: Error | Dark | Dark | Dark |
| 4. | RESET button test: | Blinking green | Dark | Dark | Dark |
| | result: | Green: OK. Red: Error | Dark | Dark | Dark |
| 5. | Detecting Relay on 1. unit: | | | Blinking green | Dark |
| | result: | | | Green: Exists Red: Error Dark: Doesn't exist | Dark |
| 6. | Detecting Relay on 2. unit: | | | Blinking green | Dark |
| | result: | | | Green: Exists Red: Error Dark: Doesn't exist | Dark |
| 7. | Detecting Current output on 1. unit, (if relay doesn't exist): | | | Blinking green | Dark |
| | result: | | | Green: Exists Red: Error Dark: Doesn't exist | Dark |
| 8. | Detecting Current output on 2. unit, (if relay doesn't exist): | | | Blinking green | Dark |
| | result: | | | Green: Exists Red: Error Dark: Doesn't exist | Dark |
| 9. | Peripheral self test results for 1sec: | | | | |
| 10. | EEPROM block test result (block1, block2): | Green: OK. Red: Error | Green: OK. Red: Error | | |
| | If content of one block is erroneous, it is corrected from the other one, if both are erroneous, they are corrected by loading default values: | Green: OK. | Green: OK. | | |
| 11. | RAM, ROM, EEPROM tests and their results: | Pale green | Pale green | Dark | Dark |
| | Device is ready: Device is ready: Device is unable to operate: | Pale green | Pale green | Red blinking together | |

5.3.2 OPERATION

- After the self test sequence, if the device is ready for operation, states and operation of the module and its units are shown as follows:

- '**COM'** LED – indicates the communication with the unit that belongs to it, (all LED-s flash in case of communication with the module), it also indicates the operation state of the device.

- '**STATUS'** LED – indicates the state of the unit that belongs to it.

| OPERATION STATES | | | |
|------------------|--------------|------------------------------|-------------------------------|
| LED: | DISPLAY: | COMMENT: | |
| COM. | PALE GREEN | Device is ready | |
| | GREEN FLASH | Successful communication | |
| | RED FLASH | Communication failure | |
| | RED | Communication cycle time-out | |
| STATUS | | RELAY UNIT | CURRENT GENERATOR UNIT |
| | GREEN | Energised | Current in linear range |
| | DARK | De-energised | - |
| | RED | - | Error (signal) current |
| | BLINKING RED | Relay error | Current generator error |

5.3.3. PROGRAMMING, SETTING THE CURRENT GENERATOR AND RELAY OPERATION

Depending on the application, re-programming of the device may be needed. Programming can be done with either a PC that controls the communication network via HART or MODBUS protocol, or a **MultiCONT** (see MultiCONT's User Manual). Parameters determining the operation:

| PARAMETERS AVAILABLE FOR ALL UNITS: | | | FACTORY SETTING |
|---|-----------------|---|-----------------|
| Communication watchdog | | | Off |
| RELAY UNIT PARAMETERS: | FACTORY SETTING | CURRENT GENERATOR UNIT PARAMETERS: | FACTORY SETTING |
| - 0...25.5 s pulse time (non restartable) | 0.1s | - Configurable error-current $\leq 3,6$ mA or ≥ 22 mA: | |
| - Configurable energised or de-energised error state: | | - for device hardware error | Off |
| - for device hardware error | Off | - for comm. cycle time-out | Off |
| - for comm. cycle time-out | Off | - Scaling values at 4 and 20 mA | Calibrated |

5.3.3.1 MODBUS COMMUNICATION PROTOCOL

Physical format: RS485, Slave, RTU, 9600 Baud, 1-8-Odd-1. Registers of the device can be accessed (read or write) with command 3 (Read Holding Registers) and command 16 (Preset Multiply Registers). Device address is adjustable in 1...31 range only. Detailed description of registers can be found in a separate document.

5.3.3.2 HART COMMUNICATION PROTOCOL

Physical format: RS485, Slave, RTU, 9600 Baud, 1-8-Odd-1. Device address is adjustable in 1...31 range. Detailed description of HART (standard 5) commands can be found in a separate document.

Logical set-up of the device:

| | | |
|--|--|--|
| MODUL Factory: 151 Type: 50 ID: xxxxxx Polling: 0..31 | UNIT 1. Factory: 151 Type: 51 ID: xxxxxx+1 | UNIT 2. Factory: 151 Type: 51 ID: xxxxxx+2 |
|--|--|--|

Interpreted commands:

| COMMAND CODE | ADDRESSING | | Module-level HART commands |
|--------------------------|------------|------|-----------------------------|
| | SHORT | LONG | |
| 0 | • | • | Read Unique ID |
| 6 | • | • | Write Polling Address |
| 7 | • | • | Read Polling Address |
| 12 | • | • | Read Message |
| 13 | • | • | Read Tag, Descriptor, Date |
| 16 | • | • | Read Final Assembly Number |
| 17 | • | • | Write Message |
| 18 | • | • | Write Tag, Descriptor, Date |
| 38 | • | • | Reset 'Config Change Flag' |
| 140 | • | • | Write Device ID |
| 200 | • | • | Read Device Table |
| 206 | • | • | Read Firmware Version |
| Unit-level HART commands | | | |
| 13 | - | • | Read Tag, Descriptor, Date |
| 18 | - | • | Write Tag, Descriptor, Date |
| 201 | - | • | Read Slot Output/Input |
| 202 | - | • | Write Slot Output |
| 203 | - | • | Read Slot Configuration |
| 204 | - | • | Write Slot Configuration |
| 205 | - | • | Write Slot Calibration |
| 206 | - | • | Read Firmware Version |

5.3.4 OTHER OPERATING SERVICES

| MODULE SERVICES: | |
|---|--|
| Operating time count | |
| COMMON SERVICES OF THE UNITS: | |
| Communication watchdog (comm. cycle time-out) | |
| RELAY UNITS' SERVICES: | CURRENT GENERATORS' SERVICE: |
| <ul style="list-style-type: none"> - Static or pulse output - Eligible pulse default state - Detection of coil splitting (error indication) - Sum of energised state times - Nr. of switching cycles - Life-time (max. numbers of switching cycles) | <ul style="list-style-type: none"> - Monitoring correct operation of current generator (error indication) |

5.3.5. RESET, TEST MODE, AND LOADING FACTORY DEFAULTS

The mentioned operations can be done, without restarting the device, with the small recessed 'RESET(TEST)' button on the front panel:

| | |
|--|---|
| RESET: | - Press |
| Entering TEST mode: | - Press and Hold |
| Loading factory default settings: | - Hold pressed while power on, and release when all LEDs flash red. |
| Attention! The current generator units should be recalibrated! The HART long addresses will change! | |

TEST MODE

Once in test mode by consecutive pressing the 'RESET(TEST)' button you can cycle through the following tests. Pressing this button until all Red LED-s are flashing will exit the test mode, without pressing the button the device quits test mode after 30 seconds.

| RELAY UNIT | 'COM.' LED-s: (identifying tested unit) | 'STATUS' LED-s correct operation: | |
|------------------------|--|-----------------------------------|----------------------|
| energised | Red | As described in 5.3.2 | |
| | | | de-energised |
| CURRENT GENERATOR UNIT | Flashing red together | | |
| | | | 3.6 mA |
| | | | 4 mA |
| | | | 12 mA |
| DIP SWITCH | Alternate flashing red | | |
| | | | 20 mA |
| correct operation | Red flashing on 1 st unit, on 2 nd unit. | | |
| | | | - switching to left: |
| - switching to right: | | | |

6. MAINTENANCE, REPAIR

The device does not require regular maintenance.

Repair within and beyond the warranty period is carried out at the Manufacturer's location.

7. STORAGE

Ambient temperature: -30 °C... +60 °C. Relative humidity: max. 98%

8. WARRANTY

All Nivelco products are warranted free of defects in materials or workmanship for a period of two years from the date of purchase, as indicated in the Certificate of Warranty.

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Nivelco reserves the right of technical changes