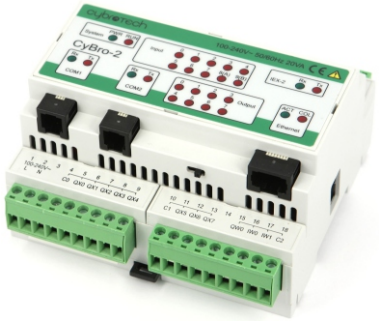








# КАТАЛОГ


**Архангельск** (8182)63-90-72
**Астрахань** (8512)99-46-04
**Барнаул** (3852)73-04-60
**Белгород** (4722)40-23-64
**Брянск** (4832)59-03-52
**Владивосток** (423)249-28-31
**Волгоград** (844)278-03-48
**Вологда** (8172)26-41-59
**Воронеж** (473)204-51-73
**Екатеринбург** (343)384-55-89
**Иваново** (4932)77-34-06
**Ижевск** (3412)26-03-58
**Иркутск** (395)279-98-46
**Казань** (843)206-01-48
**Калининград** (4012)72-03-81
**Калуга** (4842)92-23-67
**Кемерово** (3842)65-04-62
**Киров** (8332)68-02-04
**Краснодар** (861)203-40-90
**Красноярск** (391)204-63-61
**Курск** (4712)77-13-04
**Липецк** (4742)52-20-81
**Магнитогорск** (3519)55-03-13
**Москва** (495)268-04-70
**Мурманск** (8152)59-64-93
**Набережные Челны** (8552)20-53-41
**Нижний Новгород** (831)429-08-12
**Новокузнецк** (3843)20-46-81
**Новосибирск** (383)227-86-73
**Омск** (3812)21-46-40
**Орел** (4862)44-53-42
**Оренбург** (3532)37-68-04
**Пенза** (8412)22-31-16
**Пермь** (342)205-81-47
**Ростов-на-Дону** (863)308-18-15
**Рязань** (4912)46-61-64
**Самара** (846)206-03-16
**Санкт-Петербург** (812)309-46-40
**Саратов** (845)249-38-78
**Севастополь** (8692)22-31-93
**Симферополь** (3652)67-13-56
**Смоленск** (4812)29-41-54
**Сочи** (862)225-72-31
**Ставрополь** (8652)20-65-13
**Сургут** (3462)77-98-35
**Тверь** (4822)63-31-35
**Томск** (3822)98-41-53
**Тула** (4872)74-02-29
**Тюмень** (3452)66-21-18
**Ульяновск** (8422)24-23-59
**Уфа** (347)229-48-12
**Хабаровск** (4212)92-98-04
**Челябинск** (351)202-03-61
**Череповец** (8202)49-02-64
**Ярославль** (4852)69-52-93

**Киргизия** (996)312-96-26-47
**Казахстан** (7273)495-231
**Таджикистан** (992)427-82-92-69

**Единый адрес для всех регионов: chy@nt-rt.ru || https://cybrotech.nt-rt.ru/**

# Warning

## Manual

This manual describes electrical and mechanical aspects of Cybro controller, IEX-2 modules and accessories. For information about software and programming, refer to CyPro User Manual.

## Warning

This product can function correctly only when operated, maintained, transported, stored, installed and configured in accordance with recomendations. Failure to comply with applicable standards may result in damage to equipment or serious injury to personnel.

To minimize potential safety problems, you should follow all applicable local and national codes that regulate the installation and operation of your equipment. These codes vary geographically and usually change with time. It is your responsibility to determine which codes should be followed, and to verify that the equipment, installation, and operation comply with the latest revision of these codes.

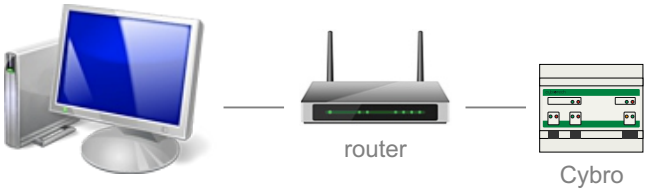
## Safety guidelines

This manual contains notices to which you should pay attention to ensure personnel safety, as well as to protect the controller and the connected equipment. These notices are highlighted with a warning triangle:

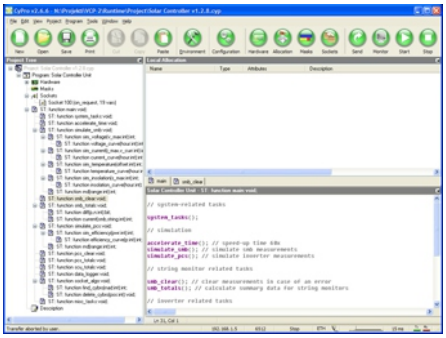
| | |
|---|---|
|  Warning | indicates that death, severe injury or substantial property damage can result if proper precautions are not taken |
|  Caution | indicates that minor to medium injury or property damage can result if proper precautions are not taken |
|  Caution | indicates hazard of severe electric shock, injury or property damage if proper precautions are not taken |

# Quick start

1. Connect power supply and Ethernet

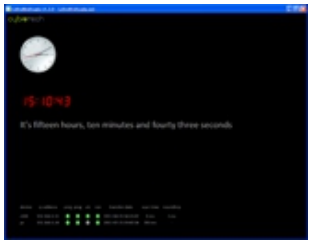



2. Install CyPro, check examples



3. Install CyBroMiniScada, check examples


Objects and actions


Analog clock

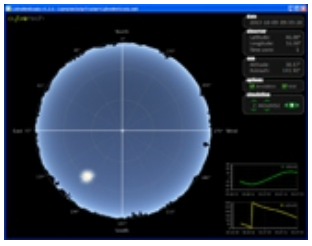

Unicode

Floor plan


GSM demo

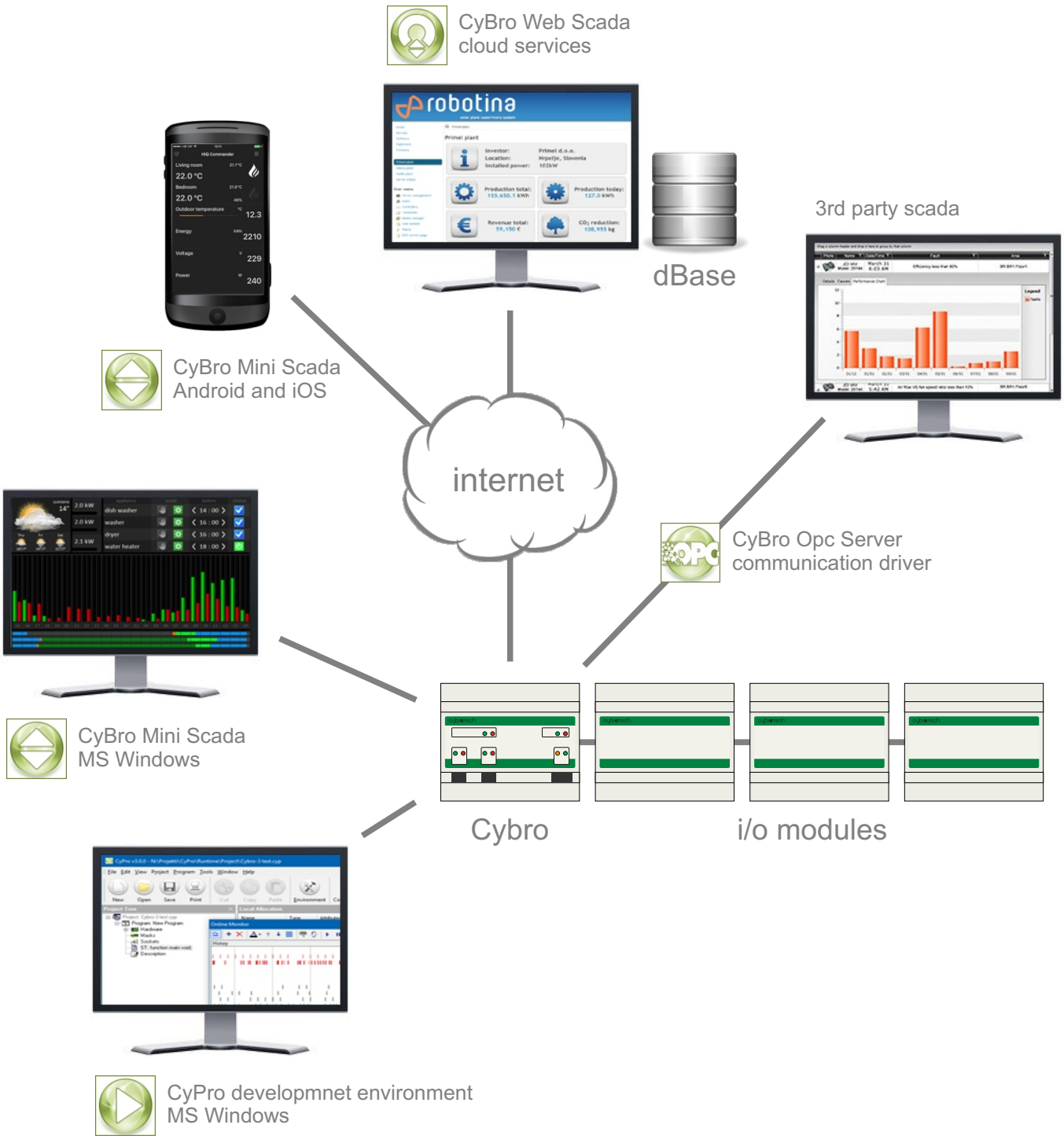
Pacman


Timeplot


Solar tracker

World weather

# System




Cybro system consists of controller, i/o modules, and software tools for programming, monitoring and visualization. Internet connectivity is integral part od the system.

# Overview

## Download

Cybro-2 only

Cybro-3 only

Cybro-2 and Cybro-3

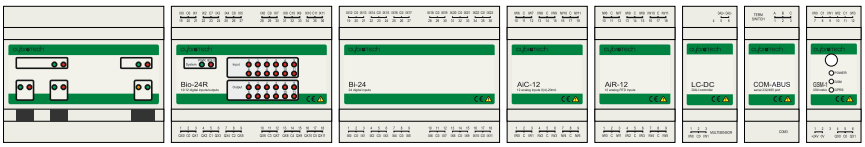
local network

internet

## Software

| | | | | |
|---|---|---|---|---|
| mini scada | | web scada | | visualization |
| backup | kiss logger | data tool | access | accessories |
| bin loader | iex manager | iex loader | relay | administrator tools |
| opc server | scgi server | http server | com server | communication drivers |
| CyPro | | | | development environment |

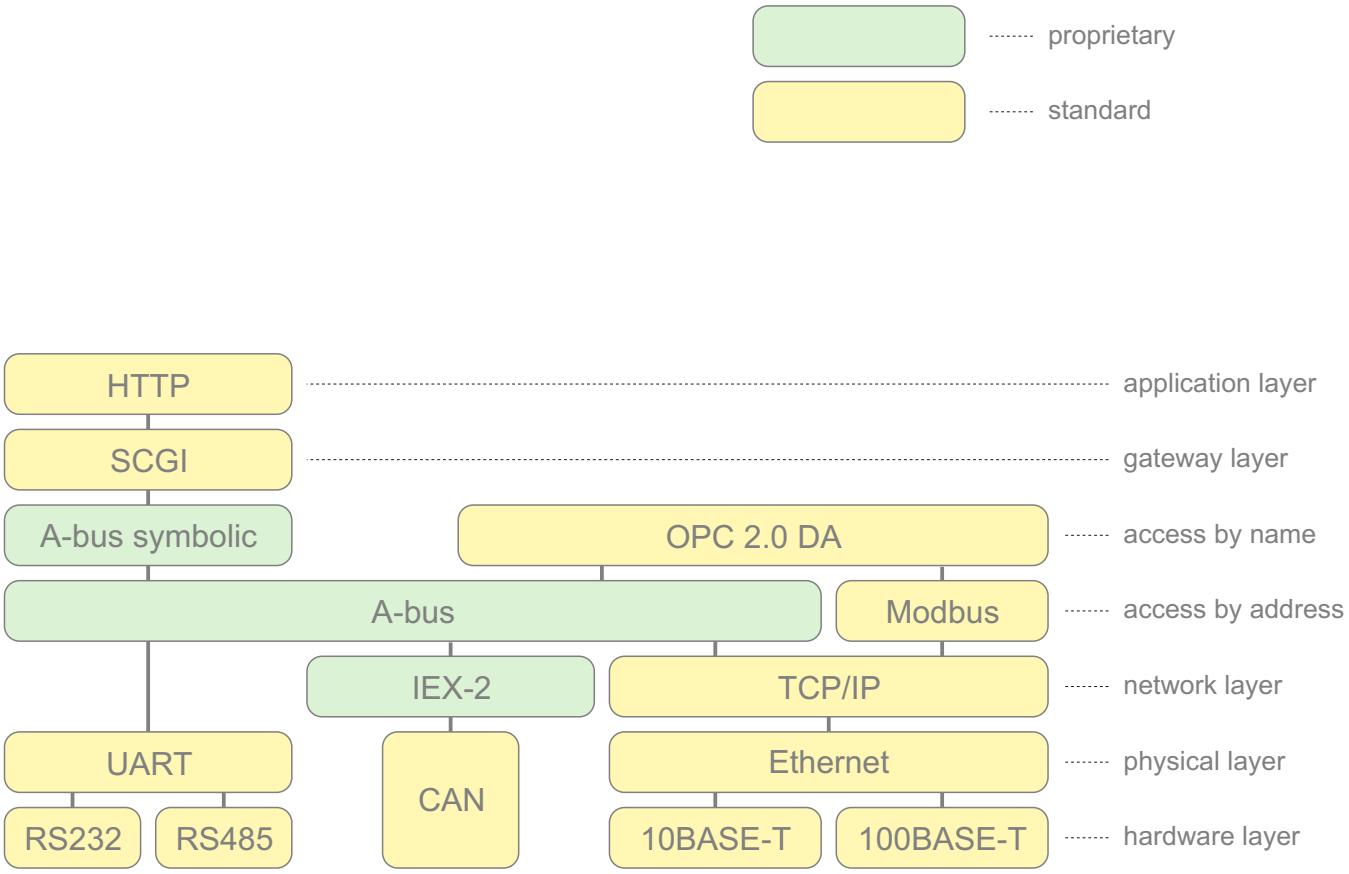
## Hardware




switchboard


field modules

# Protocols

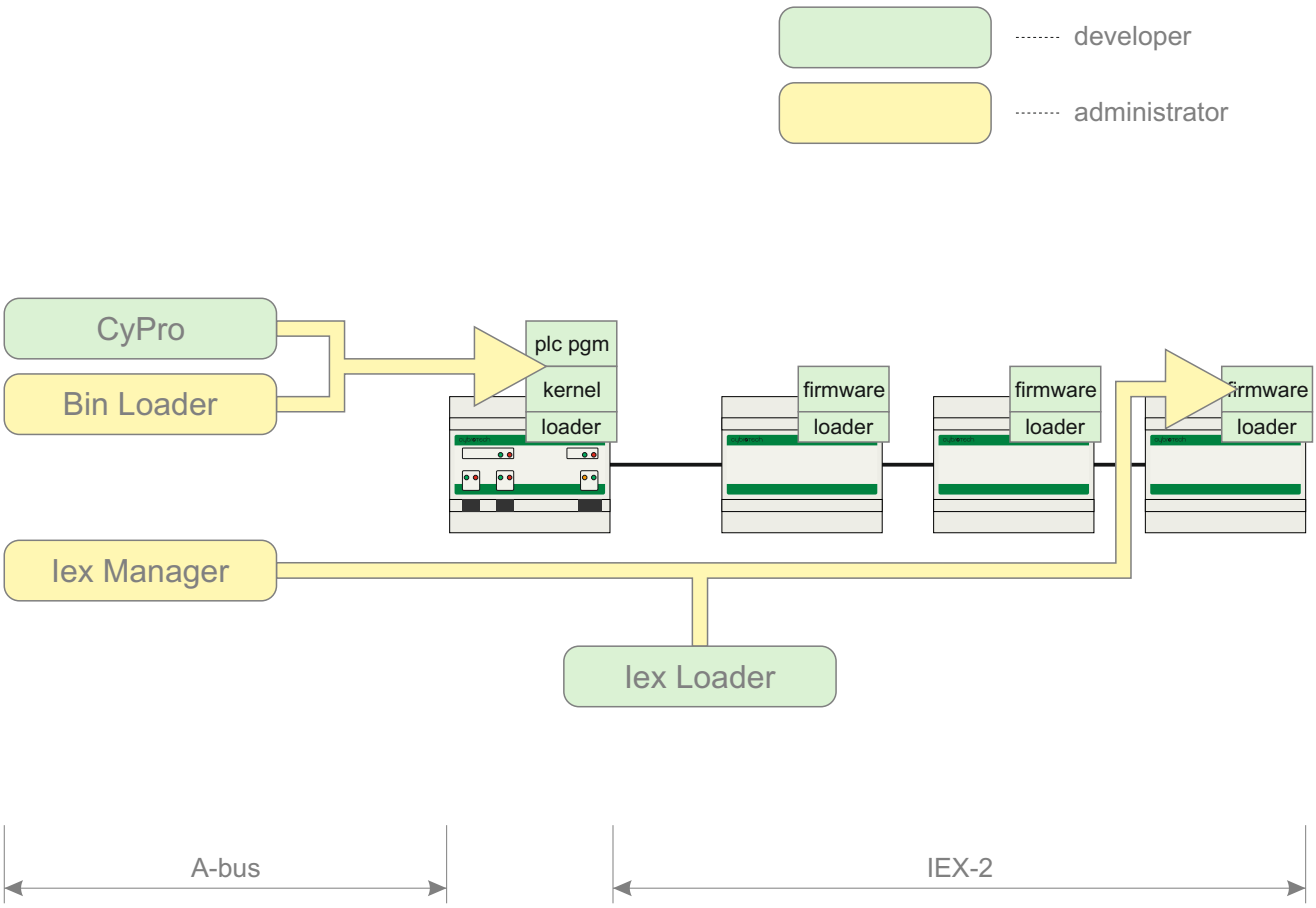



Cybro uses standard protocols whenever possible. Proprietary protocols are developed when it is necessary to keep hardware requirements low, or achieve extra functionality.

Comparing to Modbus, A-bus offers IP autodetection, NAT traversal (automatic connection to internet), CAN tunneling and symbolic extensions (access by name).

Comparing to CANopen and DeviceNet, IEX-2 serve basically the same function, but the software footprint is as low as 2kb, which makes it possible to use 8-bit controllers with a tiny bootloader.

# Firmware




Cybro firmware (kernel) is updated with CyPro or CyBroBinLoader. To use the loader, program must be saved in binary form.

IEX-2 modules are updated with CyBroIexManager. Communication is going through controller, no additional hardware is needed. CyBroIexLoader is doing essentially the same task, but it is optimized for developers, and the aditional CAN adapter is needed.

Firmware upgrade is safe, device will never brick, whatever may happen during the process. To activate device that appear unresponsive, contact tech support.

# Mounting

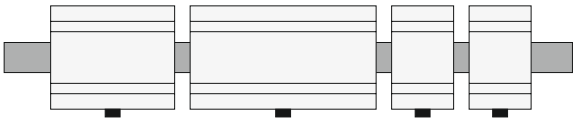
Cybro controller and expansions should be mounted vertically onto the standard DIN rail (DIN EN 50022), within a suitable enclosure. Total power dissipation inside the enclosure must not exceed permissible enclosure dissipation. Cybro is designed for a natural convection cooling, you must provide a clearance of at least 30 mm above and below the unit.

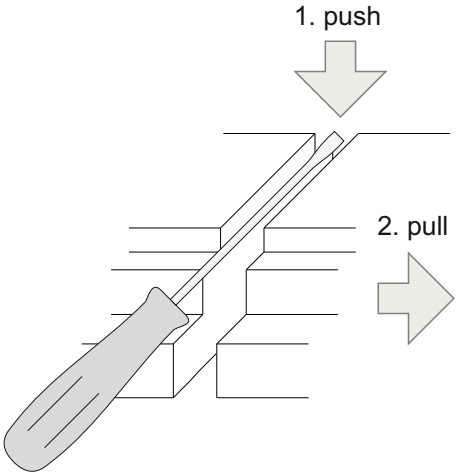
Caution

When product is subject to high temperature, high humidity, excessive dust, corrosive gases, vibration or hard impacts, it may result in an electric shock, fire or malfunction.

Install this product according to instructions. If installation is not performed correctly, it may result in unit malfunction or failure. Do not allow foreign objects, such as wire scraps, to enter the unit. This may cause fire, unit failure or malfunction.

Open the DIN clip to allow mounting, and snap close to secure the unit on the rail. When connecting units with zero-length cable, snap it first to the left unit, then snap the right unit onto the cable.






To disconnect units, use a small screwdriver to push connector clip, then pull the unit away.

# Safety

## Warning

Control devices may fail in an unsafe condition, resulting in unexpected operation of managed equipment. Such unexpected action could result in death or serious personal injury, and/or equipment damage. Always install emergency stop switch, electromechanical override, and other redundant safeguards that are independent of the programmable controller.

## Warning

Connect a power supply that meets the voltage rating, shown on the front panel. A Cybro controller may fail in an unsafe manner or present an electrical shock hazard to personnel if 230VAC is applied to terminals intended for 24V. Such failure could result in death or serious personal injury and/or equipment damage. Always supply 24V source that provides safe electrical separation from 230VAC. Never touch the terminals while the power is on. There is a risk of an electric shock, which could result in death or serious personal injury.

## Caution

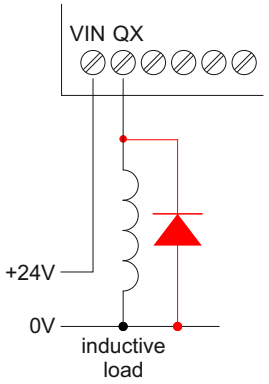
Provide a circuit breaker rated 10A/Type B that removes power from Cybro and the connected expansions. Circuit breaker or separate disconnect switch should be near the controller.

## Caution

Separate AC wiring and high-energy DC wiring from low-energy signal wiring. Equip inductive loads with suppression circuits. Use 0.5-1.5 mm (22-14 AWG) wires. Use 85°C rated wires if there are no external heat sources nearby. Put ferrules and sleeves on wires before connecting to terminals.

Follow all applicable electrical codes. Install and operate all equipment according to national and local standards. All wirings should be performed by qualified personnel.

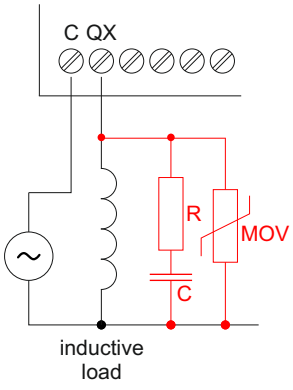
24V transistor outputs contain protective clamping diodes adequate for most applications. In case of large inductive load use external suppression diode (1N4007 or equivalent). You may also use suppression diode for DC loaded relay contacts.

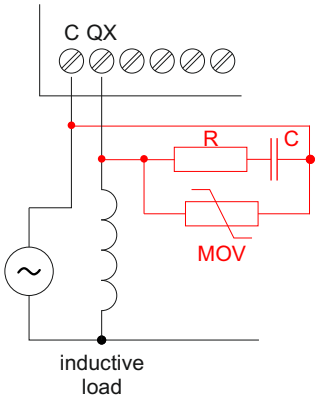



For AC loads switching use resistor/capacitor suppressors across either the load or the AC output.

R > 0.5 x Vrms [Ů]
C = 2 to 4 nF for each 10VA of load

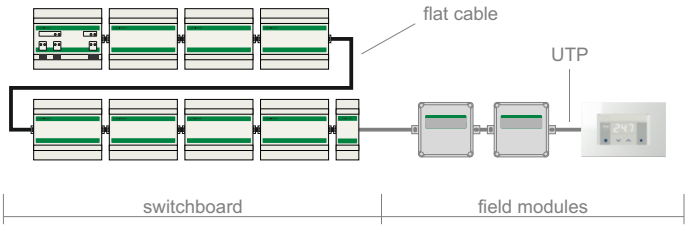
You can also use metal oxide varistor (MOV) to limit peak voltage. MOV voltage should be at least 20% greater than the nominal line voltage.



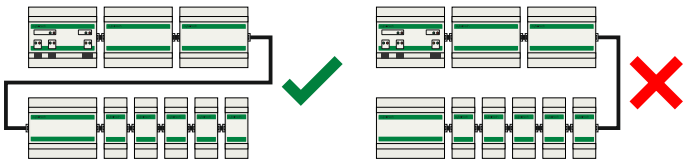
# Wiring

## Switch panel and field modules

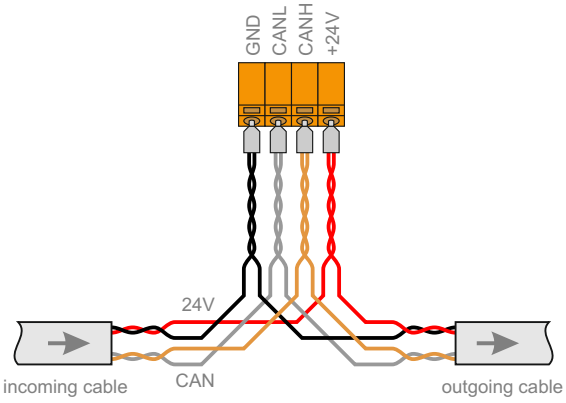



Inside the switchboard bus is connected using flat cable assembly with modular RJ9 connectors. Outside the switchboard bus is connected using unshielded twisted-pair cable, inserted into orange push-wire terminals.

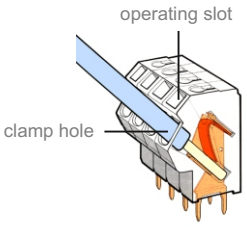
## Switch panel wiring



## Field connection




## Push-wire handling




Solid wire insertion

1. Push wire in the clamp hole

Stranded wire insertion

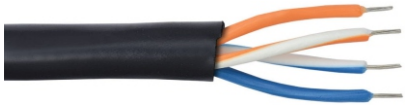
1. Push screwdriver in the operating slot
2. Insert wire in the clamp hole

Solid/stranded wire removal

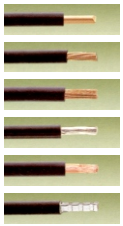
1. Push screwdriver in the operating slot
2. Remove wire

## Recommended bus cable

unshielded twisted pair 2x2 0.5mm2



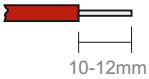
## Wire type



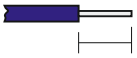
solid
stranded
fine-stranded
fine-stranded, tined
fine stranded, tip bonded
stranded with ferrule (recomended)

## Wire strip

Bus wires (orange terminals)

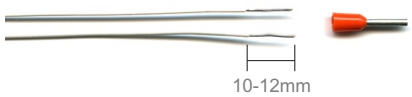



Other wires (gray terminals)



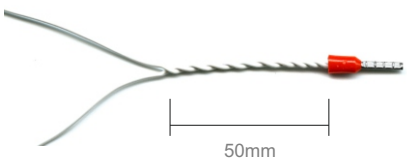

## Ferrule

1. Take one ingoing and one outgoing wire together, and remove insulation for about 10-12mm.




2. Crimp wires together into a ferrule.

3. Wrap wires together for a few centimeters.




4. Push ferrules into clamps.

# IEX-2 bus

## General

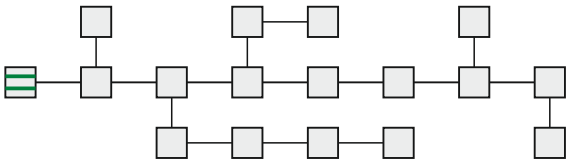
IEX-2 bus connects peripheral devices to main controller. It is based on CAN 2.0B extended frame protocol. Four wires are used, +24V/GND for power supply and CANL/CANH for communication. CAN is deterministic bus with short prioritized messages, response time is in milliseconds.

Each module has unique 21-bit network address (NAD). Module can also have alias address, assigned with IEX Manager. When alias is set, original address can't be used.

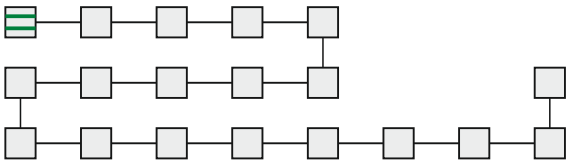
Residential modules (HIQ) are subset of IEX modules. They fully comply to the specification, but also have additional features: internal functionality, internally stored parameters and autoaddressing.

## Network topology

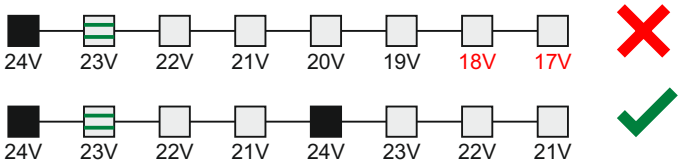
### MESH



### LINE



## Secondary power supply



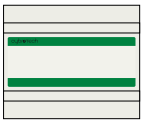

## Status LED

| PWR (green) | Status | Action |
|---|---|---|
| on | power supply ok | - |
| blinking | internal error | replace module |
| off | no power supply | check power supply |
| **IEX2 (red)** | | |
| on | no communication | check wiring |
| blinking | communication ok | - |
| off | no communication | check wiring |

Each IEX-2 module has PWR and IEX LEDs, visible when cover is lifted.

## Product range

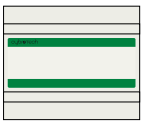
### Industrial



simple I/O
opto-coupler inputs
configuration in controller
addressed by serial number
can't work without controller

industrial

### Building



simple I/O
dry contact inputs
configuration in controller
addressed by serial number
can't work without controller

building

### Residential

local functionality
dry contact inputs
configuration in local EE
autoaddressing by position
limited stand-alone operation

building

## Bus length

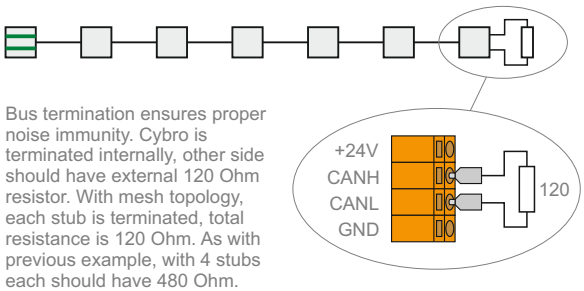
There are two factors which affect the maximum cable length:

1. Voltage drop
Wire resistance causes a drop in supply voltage. It depends on length, wire gauge and power consumption. Gauge must be selected to ensure the last module has at least a minimum allowed voltage. Otherwise, additional power supply must be inserted between the modules.

2. Signal delay
Communication speed is limited with propagation time and topology. With the default 100kbps, up to 100m can be used without restrictions. Longer cable must be connected as a line and properly terminated.

| Baudrate | MESH | LINE |
|---|---|---|
| 20kbps | 500m | 1000m |
| 50kbps | 200m | 500m |
| 100kbps (default) | 100m | 300m |
| 250kbps | 50m | 100m |
| 500kbps | 20m | 50m |

## Termination



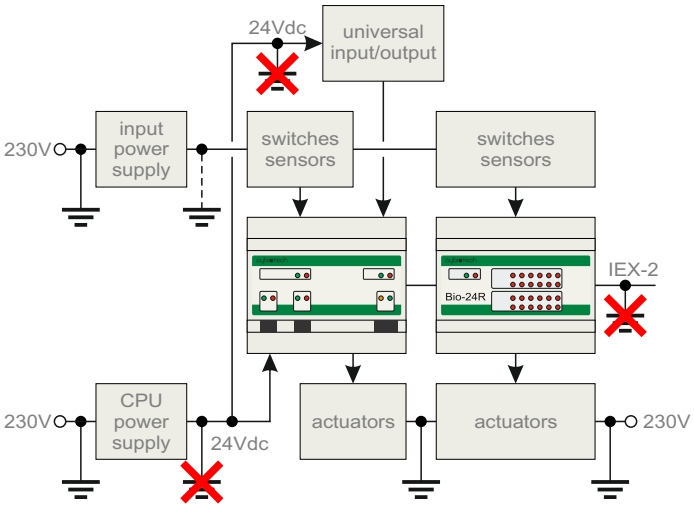

Bus termination ensures proper noise immunity. Cybro is terminated internally, other side should have external 120 Ohm resistor. With mesh topology, each stub is terminated, total resistance is 120 Ohm. As with previous example, with 4 stubs each should have 480 Ohm.

## Technical specifications

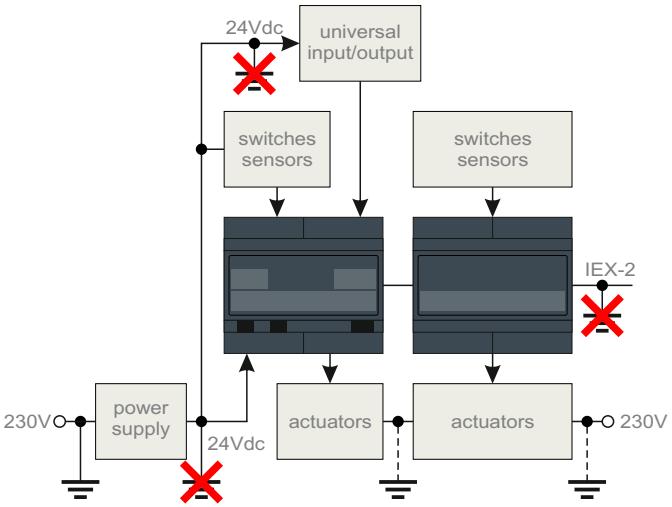
| | |
|---|---|
| Power supply | 24V (18..28V) |
| Baud rate | 20, 50, 100 (default), 250, 500kbps |
| Baud configuration | PLC: select when sending kernel<br>IEX: auto selectable on power on |
| Termination resistor | 120 Ohm 0.25W |
| Recommended cable | unshielded twisted pair 2x2 0.5mm2 |

# Supply and grounding

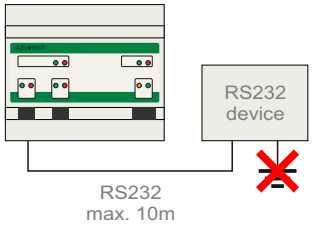
## Industrial environment



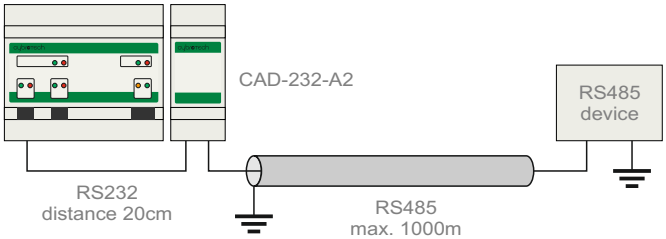

## Home and building environment



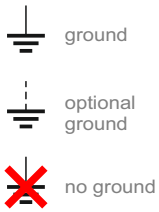

## RS232 connection



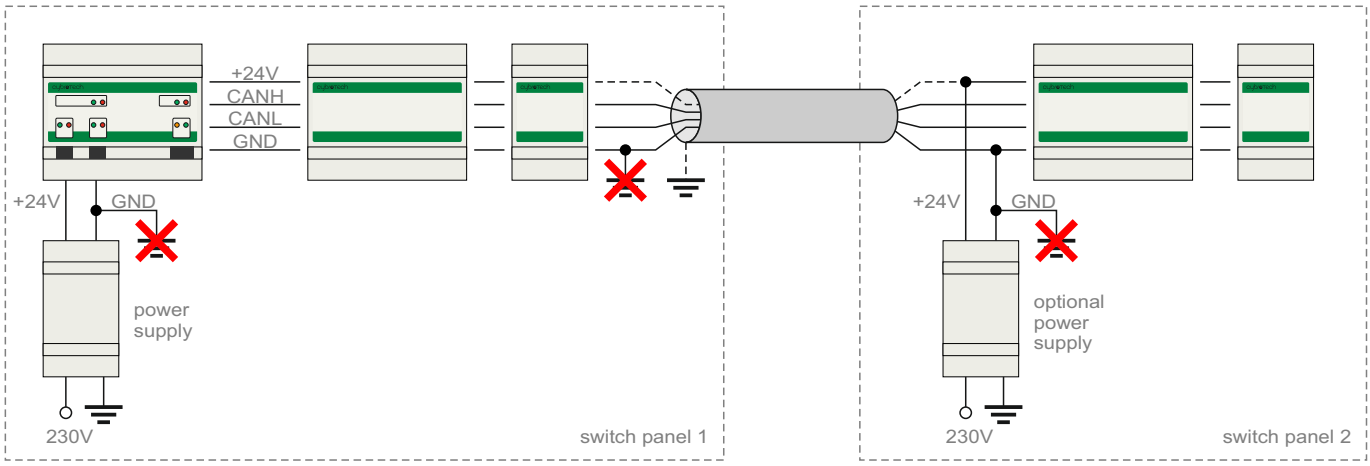

## RS485 connection




## Legend




## Connecting switch panels

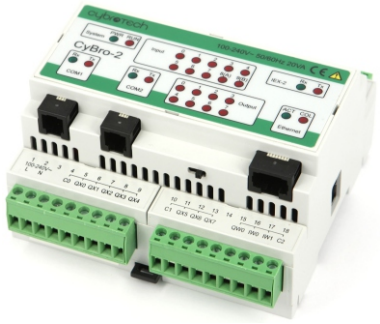



+24V line may be cut off, depending on type of power supplies. If they can work in parallel, leave it connected. GND line (digital ground) must be connected to all devices, failure to do so may result in severe damage. GND is never grounded, cable shield may be grounded or not. Generally, it is grounded in industrial, and left floating in home and building applications.

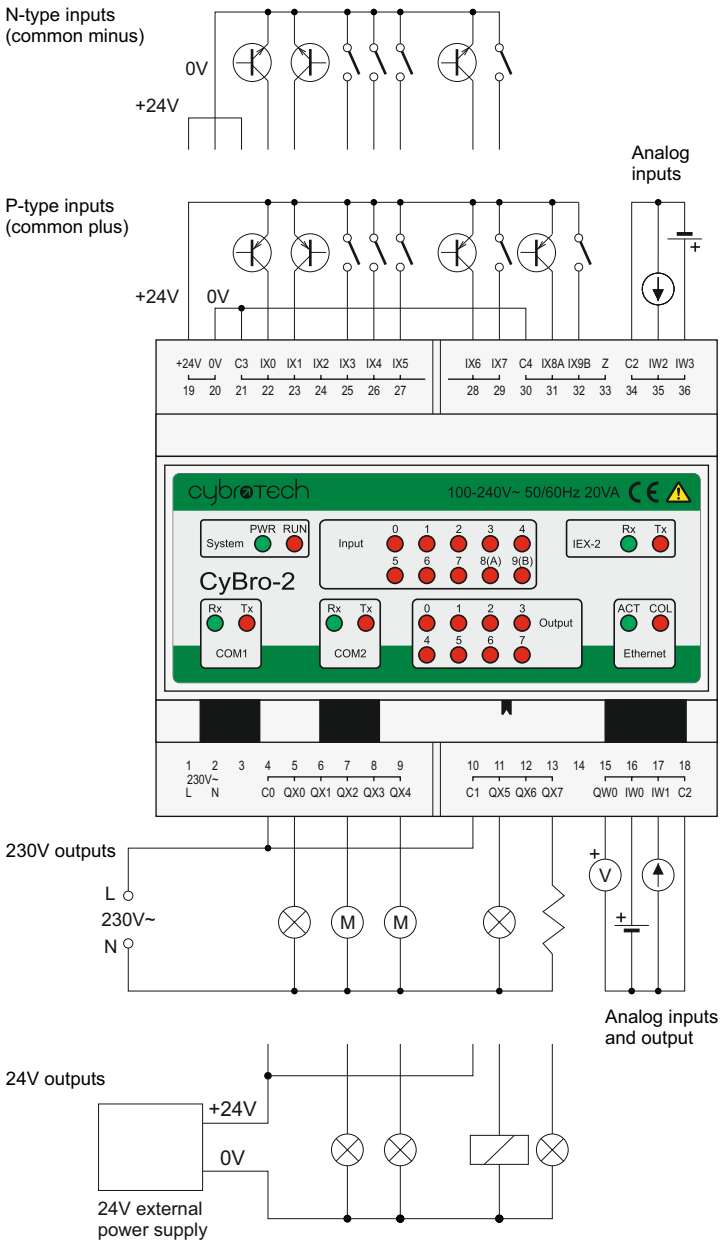
# Cybro-2

programmable controller
10 opto-coupler inputs 24V
8 relay outputs 5A
Ethernet, IEX-2, 2x RS-232

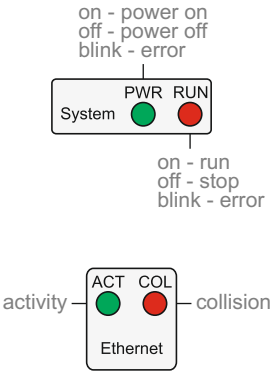
industrial building



## Wiring diagram




## LED signalling




| Error signaling | Diagnostics / Action |
|---|---|
| PWR led<br>0.5Hz blinking,<br>RUN led off | hardware error, replace unit |
| PWR led on,<br>RUN led<br>1Hz blinking | program error, send program |
| PWR led on,<br>RUN led<br>5Hz blinking | kernel error, send kernel |

Outputs QX0-QX4 are galvanically separated from QX5-QX7. Mixing of 230V and 24V groups is allowed.

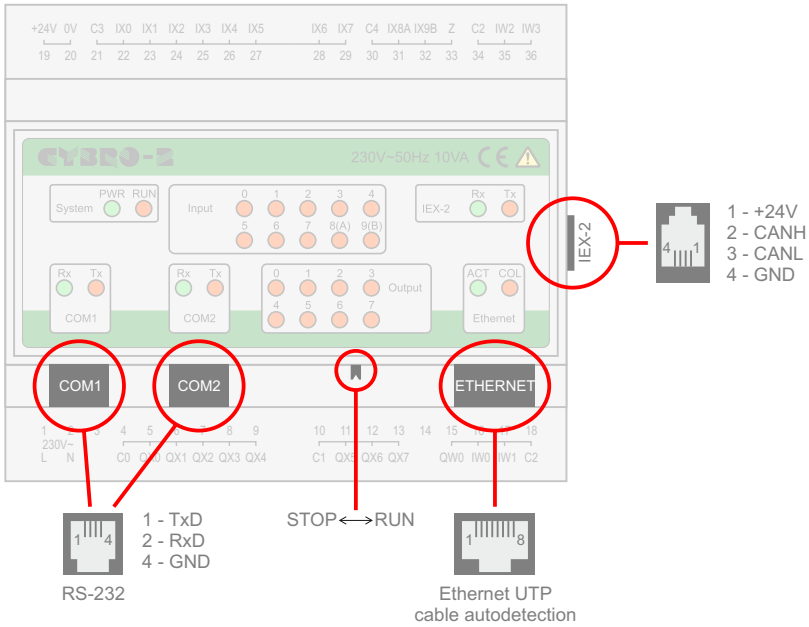
IX0-IX7 are 24V bidirectional inputs - both P-type and N-type connection is possible. IX8A and IX9B are unidirectional inputs for P-type connection only.

Each analog input can be set independently to voltage or current measurement:
DIP switch ON: 0(4)..20 mA
DIP switch OFF: 0..10V

## Order code

| | |
|---|---|
| CYBRO-2-24-E | 24V power supply |
| CYBRO-2-230-E | 230V power supply |

## Ports




## RUN/STOP switch

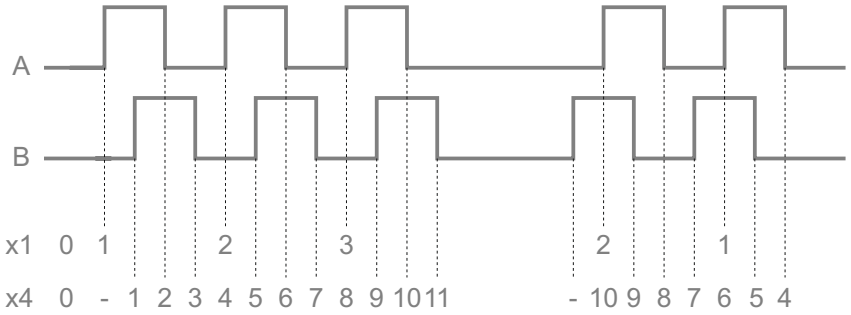
The RUN/STOP switch determines the program state after applying power supply. If the switch is in the RUN position, CyBro-2 will automatically start executing the program. If the switch position is altered, the program state will be changed accordingly.

If CyBro-2 is connected to the PC, it is possible to send a new program and change the program state from the PC, regardless of the switch position.

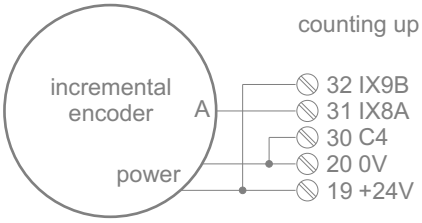
## Terminals

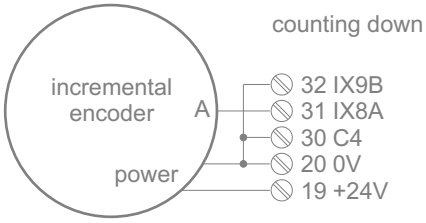
| No | Name | Description | No | Name | Description |
|---|---|---|---|---|---|
| 1 | 230V~ (+24V=) | power supply 230V~ (power supply 24V= version) | 19 | +24V | power output |
| 2 | 230V~ (0V=) | power supply 230V~ (power supply 24V= version) | 20 | 0V | power output |
| 3 | - | not connected | 21 | C3 | common for ix000-ix007 |
| 4 | C0 | common for qx000-qx004 | 22 | IX0 | ix000 |
| 5 | QX0 | qx000 | 23 | IX1 | ix001 |
| 6 | QX1 | qx001 | 24 | IX2 | ix002 |
| 7 | QX2 | qx002 | 25 | IX3 | ix003 |
| 8 | QX3 | qx003 | 26 | IX4 | ix004 |
| 9 | QX4 | qx004 | 27 | IX5 | ix005 |
| 10 | C1 | common for qx005-qx007 | 28 | IX6 | ix006 |
| 11 | QX5 | qx005 | 29 | IX7 | ix007 |
| 12 | QX6 | qx006 | 30 | C4 | common for ix008A-ix010Z |
| 13 | QX7 | qx007 | 31 | IX8A | ix008A |
| 14 | - | not connected | 32 | IX9B | ix009B |
| 15 | QW0 | qw000 | 33 | Z | Z |
| 16 | IW0 | iw000 | 34 | C2 | analog common |
| 17 | IW1 | iw001 | 35 | IW2 | iw002 |
| 18 | C2 | analog common | 36 | IW3 | iw003 |

## High speed counter

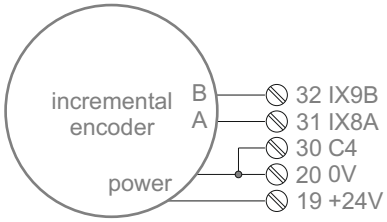



A x1 (single phase, single precision)

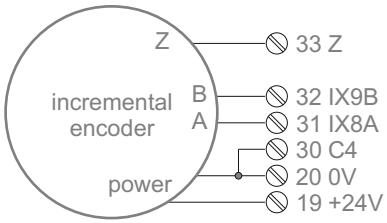



AB x1 (dual phase, single precision)
AB x4 (dual phase, double precision)

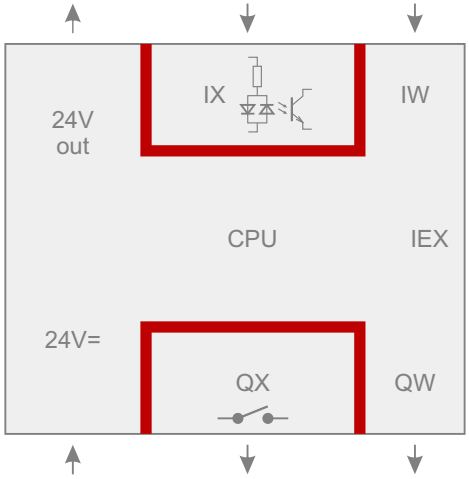



AB+Z x1 (dual phase + zero, single precision)
AB+Z x4 (dual phase + zero, double precision)

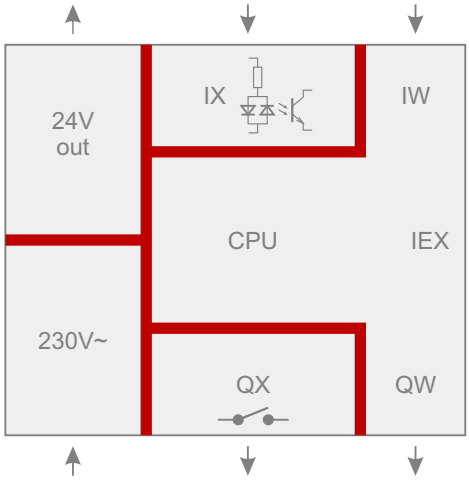


## Galvanic isolation

CyBro-2-24 (24VDC)




CyBro-2-230 (230VAC)




## Technical specifications

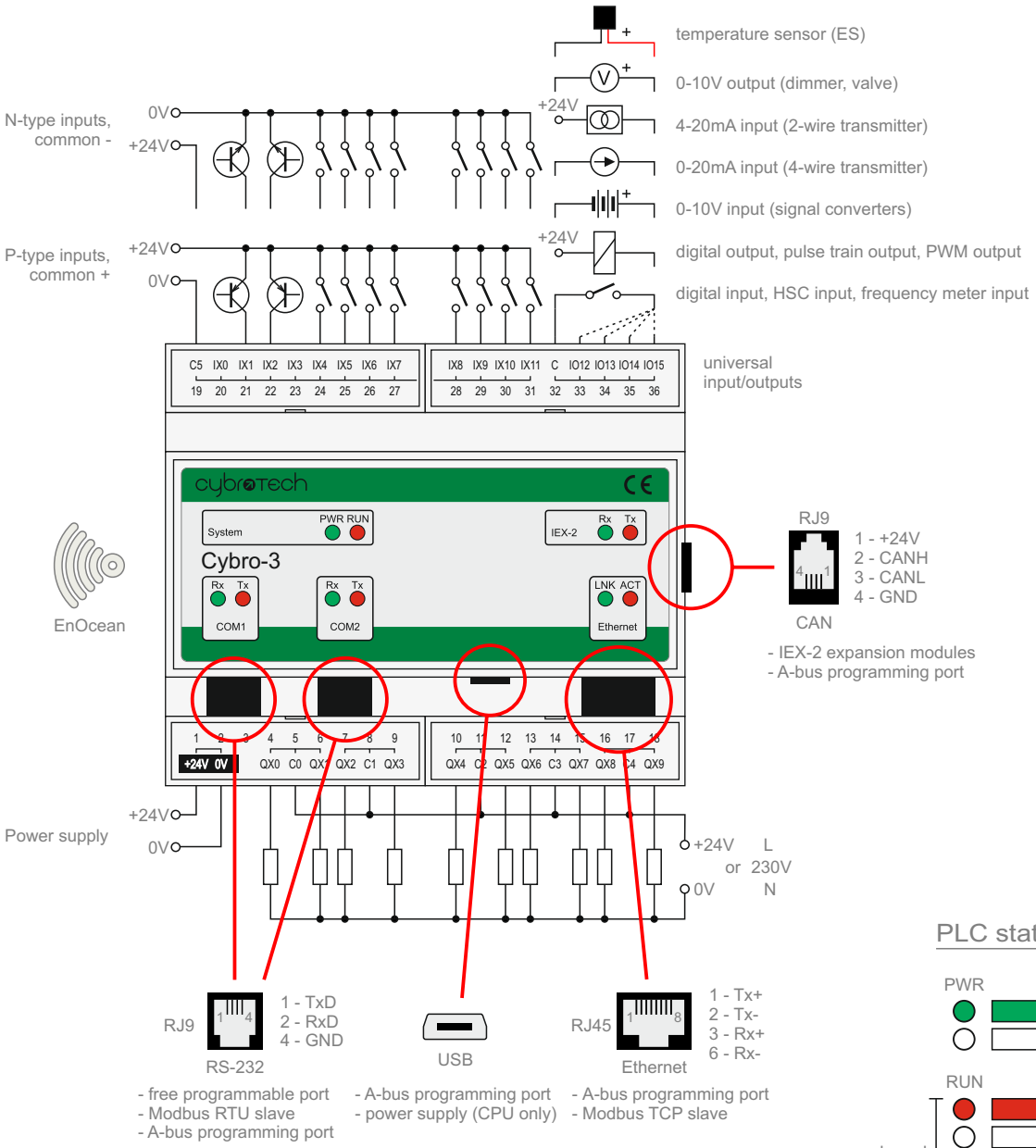
| | |
|---|---|
| System clock | 24MHz |
| Instruction execution | 250ns per basic instruction |
| Program memory | 512Kb flash, 64Kb available for user program |
| Data memory | 128Kb RAM, 32Kb available for user data |
| Data types | bit, integer, long, real, word, timer, counter |
| Data retention | min. 7 days (retentive variables)<br>unlimited (EE variables) |
| Timer base | 10ms, 100ms or 1s |
| Number of i/o points | 10 digital inputs (2 shared with HSC)<br>1 dedicated digital input (HSC zero)<br>8 digital outputs<br>4 analog inputs<br>1 analog output |
| **Digital inputs** | |
| Input type | IX0..IX7: 24V 7mA, opto isolated, bidirectional |
| Input type | IX8..IX9: 24V 7mA, opto isolated, common ground |
| Debounce filter | 0 or 5ms software selectable |
| **Digital outputs** | |
| Output type | relay 5A/250VAC or 3A/30VDC resistive, normally open |
| **Analog inputs** | |
| Input type | 0..10V or 0(4)..20 mA, selectable by DIP switches |
| Input resistance | 40 kohm (0..10V)<br>250 ohm (0..20mA) |
| Resolution | 8 bits |
| Accuracy | typ. 2% of FSR at 25°C |
| **Analog output** | |
| Output type | 0..10V |
| Output current | max. 10mA |
| Resolution | 8 bits |
| Accuracy | typ. 2% of FSR at 25°C |
| **HSC (high speed counter)** | |
| Input frequency | max. 10kHz (50% duty cycle) |
| Operation mode | single phase (A x1)<br>dual phase (up/down, AB x1)<br>dual phase with zero (up/down, AB+Z x1)<br>dual phase high precision glitch removal (up/down, AB x4)<br>dual phase high precision g.r. with zero (up/down, AB+Z x4) |
| **RTC (real-time clock)** | |
| Accuracy | max. +/-5 sec/day, typ. +/-2 sec/day (at 25°C) |
| **IEX-2 bus** | |
| Bus load | max. 31 modules |
| Baud rate | 20, 50, 100 (default), 250, 500kbps, software selectable |
| Cable length | max. 300m (100kbps, terminated)<br>max. 100m (100kbps, non-terminated) |
| Operating conditions | 0..50°C, 0..85% rh non-condensing |
| Level of ambient pollution | 2 |
| Mounting | DIN rail (35mm) |
| Dimensions | 106x117x58mm |
| Weight | 380g |
| Degree of protection | IP20 |
| Installation category | II |
| Standards | EN 61010-1, EN 61010-2-201, EN 61131-2 |
| **CyBro-2-230** | |
| Power supply | 230VAC (100-240VAC), 50/60Hz |
| Power consumption | typ. 4W (CPU, no external load)<br>typ. 5W (CPU + 8 relays, no external load) |
| Power output (24Vout+IEX) | 24V max. 320mA (at 85..260VAC, max. 50°C)<br>24V max. 500mA (at 230..240VAC, max. 40°C) |
| **CyBro-2-24** | |
| Power supply | 24VDC (19-28VDC) |
| Nominal power rating | typ. 4W (CPU, no external load) |
| Power consumption | typ. 5W (CPU + 8 relays, no external load) |
| Power output (24Vout+IEX) | 24V 2A |

# Cybro-3

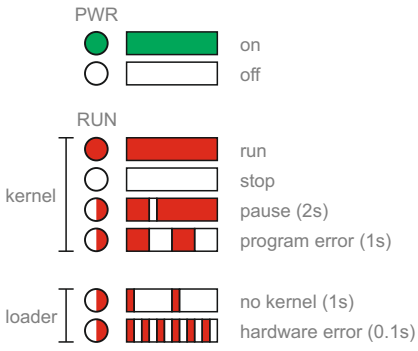
programmable controller
12 opto-coupler inputs 24V
10 relay outputs 8A
4 universal input/outputs
Ethernet, USB, IEX-2, 2x RS-232
EnOcean gateway (optional)
24V DC power supply

industrial building

**EXAMPLE**
CyPro/Examples/
CybroDashboard




## PLC status

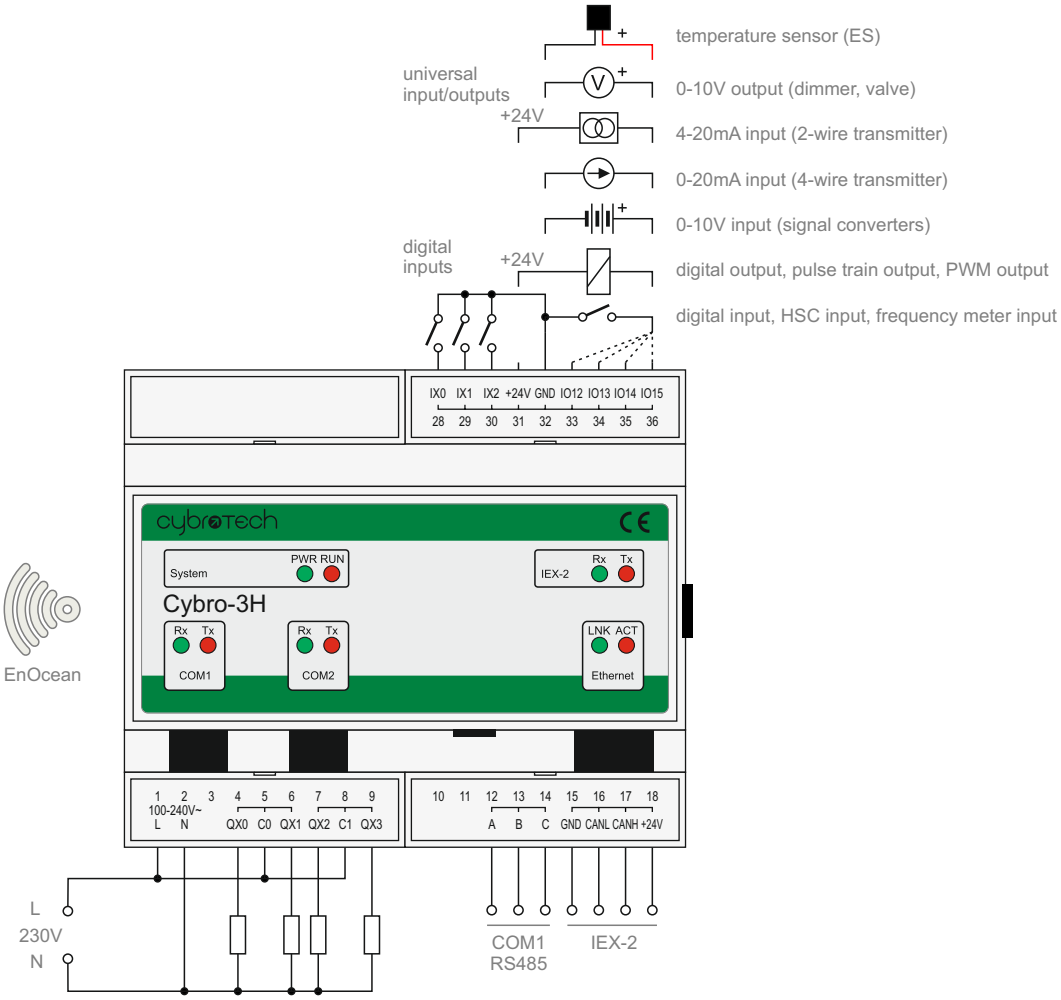



For more details, check CyPro status bar.

# Cybro-3H

programmable controller
3 digital inputs
4 relay outputs 8A
4 universal input/outputs
1 RS232/485, 1 RS232
Ethernet, USB, IEX-2
EnOcean gateway (optional)
230V AC power supply

building




Note: Because of RS485 transceiver, COM1 port is limited to half-duplex operation. If receiver is active, transmitted message will be echoed back.

## Technical specifications

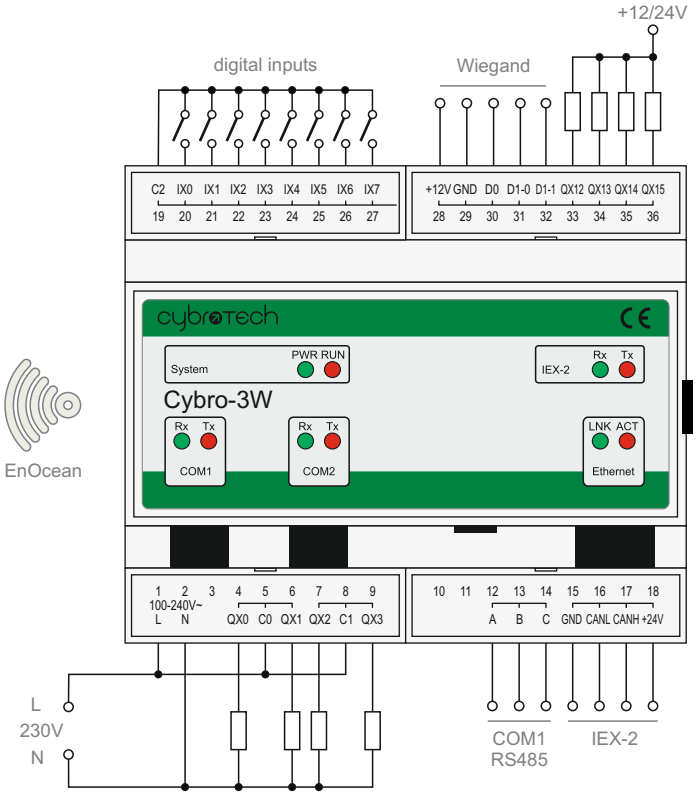
| | |
|---|---|
| Input type (ix00..ix02) | dry contact, internal pull-up 12V 2mA |
| Galvanic isolation | none |
| Cable length | 50m |
| | |
| COM1 interface | RS232 (RJ9), RS485 (terminals) |
| Galvanic isolation | none (RS232), none or 1kV (RS485) |
| Cable length | 10m (RS232), 50 or 500m (RS485) |
| Transmit/receive | automatic switching (RS485) |
| | |
| Power supply | 100..240VAC, 50/60Hz |
| Power consumption | 1W (no load), 10W max. |
| Total power output | 24V 200mA (IEX-2+24V output) |
| | |
| Standards | EN 60730-1 |

Other specifications are common for all Cybro-3 models.

# Cybro-3W

programmable controller
8 digital inputs
4 relay outputs 8A
4 NPN outputs 1A
2 Wiegand interface
1 RS232/485, 1 RS232
Ethernet, USB, IEX-2
EnOcean gateway (optional)
230V AC power supply

building




Note: Because of RS485 transceiver, COM1 port is limited to half-duplex operation. If receiver is active, transmitted message will be echoed back.

## Technical specifications

| | |
|---|---|
| Input type (ix00..ix07) | dry contact, internal pull-up 12V 2mA |
| Galvanic isolation | none |
| Cable length | 50m |
| Output type (qx12..qx15) | NPN transistor 30V 1A |
| Permanent load | 1.5A qx12+qx13 and 1.5A qx14+qx15 |
| Protection | short circuit, overvoltage, overheating |
| Galvanic isolation | none |
| COM1 interface | RS232 (RJ9), RS485 (terminals) |
| Galvanic isolation | none (RS232), none or 1kV (RS485) |
| Cable length | 10m (RS232), 50 or 500m (RS485) |
| Transmit/receive | automatic switching (RS485) |
| Wiegand input | active low, internal pull-up 3V3 1mA |
| Pulse timing | 20us min width, 20ms max spacing |
| Power output | 12V 500mA (RFID reader) |
| Power supply | 100..240VAC, 50/60Hz |
| Power consumption | 1W (no load), 10W max. |
| IEX-2 power output | 24V 250mA |
| Wiegand power output | 12V 500mA |
| Total power output | 6W (IEX-2+Wiegand) |
| Standards | EN 60730-1 |

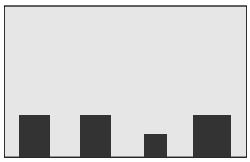
Other specifications are common for all Cybro-3 models.

# Order code

Select one CPU, one baseboard and optional galvanic isolation.

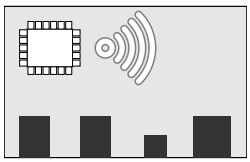
## CPU

◉ default



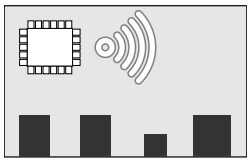
ARM core, 1Mb + 256Kb
Ethernet, USB, 2x RS232

○ ENO



ARM core, 1Mb + 256Kb
Ethernet, USB, 2x RS232
EnOcean gateway

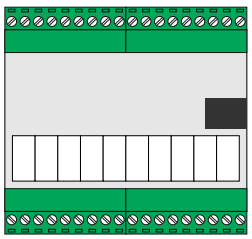
○ RFM



ARM core, 1Mb + 256Kb
Ethernet, USB, 2x RS232
868MHz free programmable

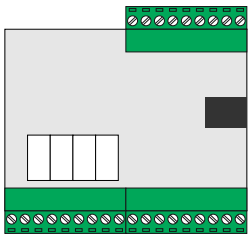
## baseboard

◉ 3-24



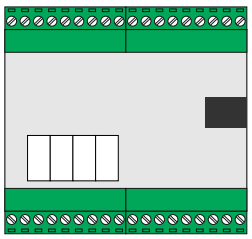
12 opto-coupler inputs
10 relay outputs 8A
4 universal inputs/outputs
IEX-2 RJ9 connector
24V DC power supply

○ 3H-230



3 digital inputs
4 relay outputs 8A
4 universal inputs/outputs
1 RS485 interface (COM1)
IEX-2 RJ9 and terminals
230V AC power supply

○ 3W-230



8 digital inputs
4 relay outputs 8A
4 NPN outputs 1A
2 Wiegand interface
1 RS485 interface (COM1)
IEX-2 RJ9 and terminals
230V AC power supply

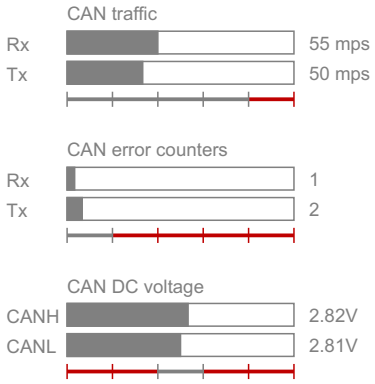
☐ ISO galvanically isolated RS485

### Examples

Cybro-3-24
Cybro base model, 24V DC power supply

Cybro-3H-230-ISO-ENO
Cybro with galvanically isolated RS485, EnOcean gateway and 230V AC power supply

### CAN diagnostics




Number of transmitted and received messages per second. Overload may cause a slower response time.

Current state of CAN error counters. High number may be caused by harsh environment or bad wiring.

DC voltage measured on bus lines. More then 10% difference between lines indicate a hardware fault.

A set of indicators related to bus health. Irregular values are caused by chip defect or short circuit. Slightly off range value may serve as an early warning, before a major malfunction occur. To find the faulty device, unplug them from the bus one by one.

# Terminals

## Cybro-3-24

| No | Name | Description |
|---|---|---|
| 1 | +24V | power supply input |
| 2 | 0V | digital ground, power supply input |
| 3 | - | not connected |
| 4 | QX0 | relay output qx00 |
| 5 | C0 | common for qx00 and qx01 |
| 6 | QX1 | relay output qx01 |
| 7 | QX2 | relay output qx02 |
| 8 | C1 | common for qx02 and qx03 |
| 9 | QX3 | relay output qx03 |
| 10 | QX4 | relay output qx04 |
| 11 | C2 | common for qx04 and qx05 |
| 12 | QX5 | relay output qx05 |
| 13 | QX6 | relay output qx06 |
| 14 | C3 | common for qx06 and qx07 |
| 15 | QX7 | relay output qx07 |
| 16 | QX8 | relay output qx08 |
| 17 | C4 | common for qx08 and qx09 |
| 18 | QX9 | relay output qx09 |

| No | Name | Description |
|---|---|---|
| 19 | C5 | common for ix00..ix11 |
| 20 | IX0 | digital input ix00 |
| 21 | IX1 | digital input ix01 |
| 22 | IX2 | digital input ix02 |
| 23 | IX3 | digital input ix03 |
| 24 | IX4 | digital input ix04 |
| 25 | IX5 | digital input ix05 |
| 26 | IX6 | digital input ix06 |
| 27 | IX7 | digital input ix07 |
| 28 | IX8 | digital input ix08 |
| 29 | IX9 | digital input ix09 |
| 30 | IX10 | digital input ix10 |
| 31 | IX11 | digital input ix11 |
| 32 | C | digital ground, common for io12..io15 |
| 33 | IO12 | universal input/output io12 |
| 34 | IO13 | universal input/output io13 |
| 35 | IO14 | universal input/output io14 |
| 36 | IO15 | universal input/output io15 |

## Cybro-3H-230

| No | Name | Description |
|---|---|---|
| 1 | 230V L | power supply input, live |
| 2 | 230V N | power supply input, neutral |
| 3 | - | not connected |
| 4 | QX0 | relay output qx00 |
| 5 | C0 | common for qx00 and qx01 |
| 6 | QX1 | relay output qx01 |
| 7 | QX2 | relay output qx02 |
| 8 | C1 | common for qx02 and qx03 |
| 9 | QX3 | relay output qx03 |
| 10 | - | not connected |
| 11 | - | not connected |
| 12 | A | RS485 communication line + |
| 13 | B | RS485 communication line - |
| 14 | C | RS485 protective ground |
| 15 | GND | digital ground for IEX modules |
| 16 | CANL | communication line for IEX modules |
| 17 | CANH | communication line for IEX modules |
| 18 | +24V | power supply output for IEX modules |

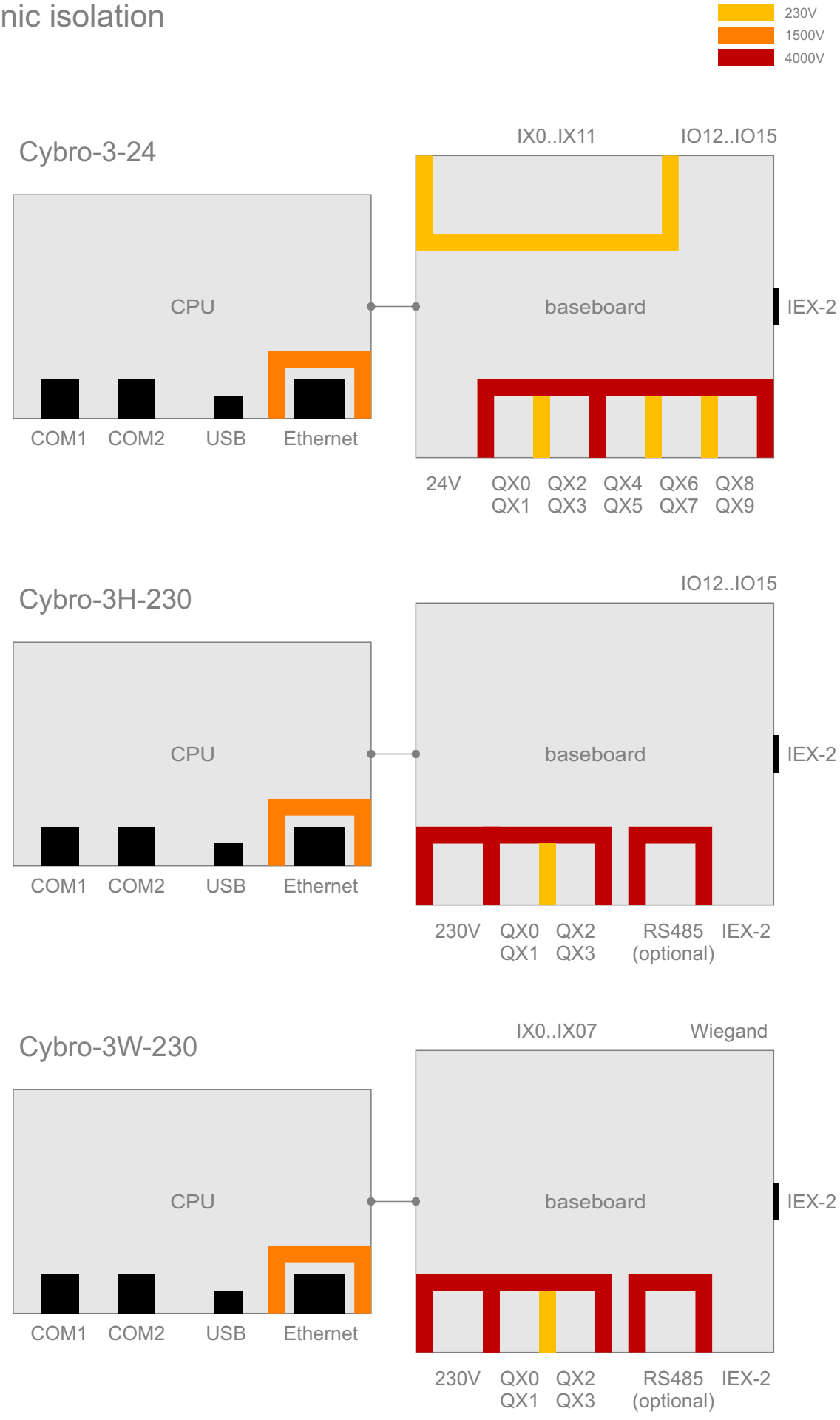
| No | Name | Description |
|---|---|---|
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| 28 | IX0 | digital input ix00 |
| 29 | IX1 | digital input ix01 |
| 30 | IX2 | digital input ix02 |
| 31 | +24V | power supply output for universal i/o |
| 32 | GND | digital ground, common for io12..io15 |
| 33 | IO12 | universal input/output io12 |
| 34 | IO13 | universal input/output io13 |
| 35 | IO14 | universal input/output io14 |
| 36 | IO15 | universal input/output io15 |

## Cybro-3W-230

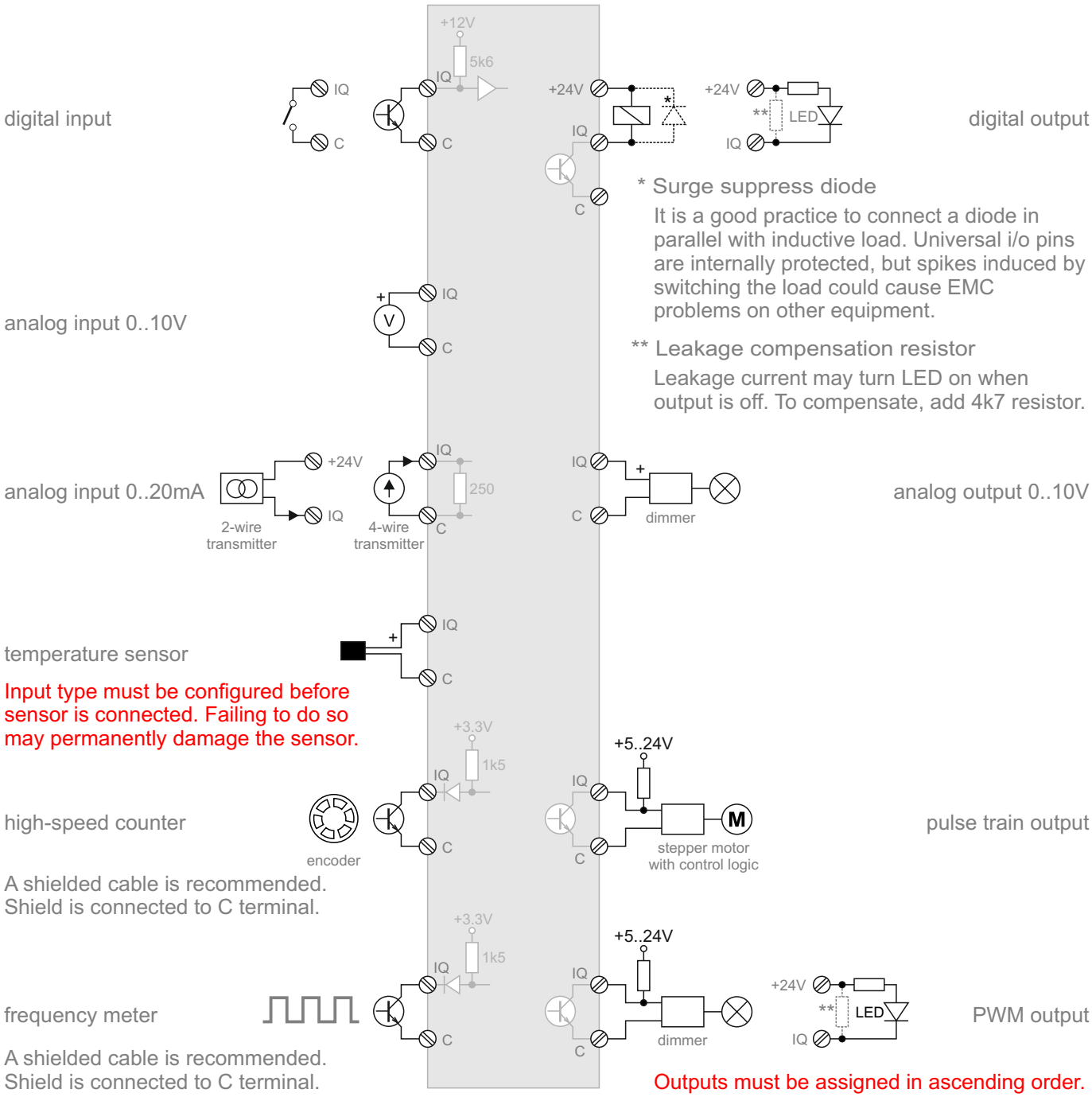
| No | Name | Description |
|---|---|---|
| 1 | 230V L | power supply input, live |
| 2 | 230V N | power supply input, neutral |
| 3 | - | not connected |
| 4 | QX0 | relay output qx00 |
| 5 | C0 | common for qx00 and qx01 |
| 6 | QX1 | relay output qx01 |
| 7 | QX2 | relay output qx02 |
| 8 | C1 | common for qx02 and qx03 |
| 9 | QX3 | relay output qx03 |
| 10 | - | not connected |
| 11 | - | not connected |
| 12 | A | RS485 communication line + |
| 13 | B | RS485 communication line - |
| 14 | C | RS485 protective ground |
| 15 | GND | digital ground for IEX modules |
| 16 | CANL | communication line for IEX modules |
| 17 | CANH | communication line for IEX modules |
| 18 | +24V | power supply output for IEX modules |

| No | Name | Description |
|---|---|---|
| 19 | C2 | digital ground, common for ix00..ix07 |
| 20 | IX0 | digital input ix00 |
| 21 | IX1 | digital input ix01 |
| 22 | IX2 | digital input ix02 |
| 23 | IX3 | digital input ix03 |
| 24 | IX4 | digital input ix04 |
| 25 | IX5 | digital input ix05 |
| 26 | IX6 | digital input ix06 |
| 27 | IX7 | digital input ix07 |
| 28 | +12V | power supply output for wiegand readers |
| 29 | GND | digital ground for wiegand readers |
| 30 | D0 | wiegand D0 line, common for both readers |
| 31 | D1-0 | wiegand D1 line, first reader |
| 32 | D1-1 | wiegand D1 line, second reader |
| 33 | QX12 | transistor output qx12 |
| 34 | QX13 | transistor output qx13 |
| 35 | QX14 | transistor output qx14 |
| 36 | QX15 | transistor output qx15 |

# Galvanic isolation



# Universal input/output

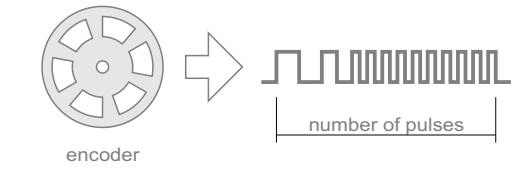



Terminal C is internally connected to digital ground.

| Mode | ix | qx | iw | qw |
|---|---|---|---|---|
| 0. not used | - | - | - | - |
| 1. binary input | binary input | - | mV | - |
| 2. binary output | binary input | binary output | mV | - |
| 3. analog input 0..20mA | - | - | uA | - |
| 4. analog input 0..10V | - | - | mV | - |
| 5. analog output 0..10V | - | - | mV | 0..10000mV |
| 6. temperature sensor | - | - | 0.1°C | - |
| 7. single phase counter | binary input | reset | pulse count | - |
| 8. dual phase counter | binary input | reset | pulse count | - |
| 9. frequency meter | binary input | - | Hz | - |
| 10. pulse train output | run indicator | start | pulse count | 0..65535 pulses |
| 11. pwm output | - | - | - | 0..100% |

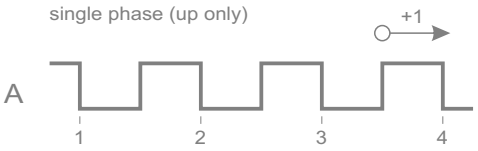
Input/output variables, related to the selected mode. Terminal monitoring is avaliable in most modes.

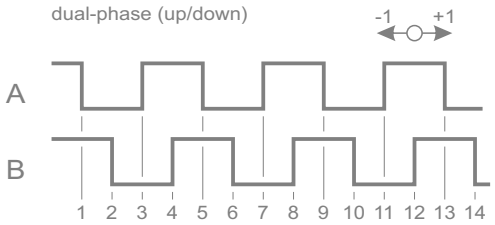
## High-speed counter

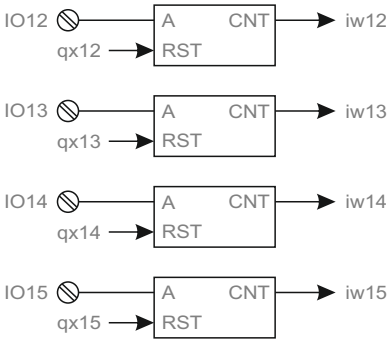



Extend counting range from 16 to 32-bit:

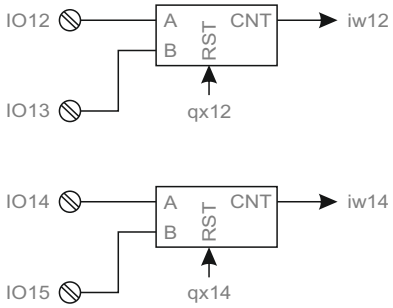
```
var long iw12_long, int iw12_old;

iw12_long := iw12_long + (iw12 - iw12_old);
iw12_old := iw12;
```



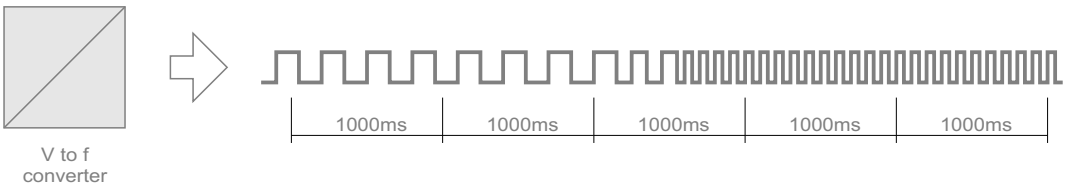

A - counter input
CNT - number of pulses
RST - reset

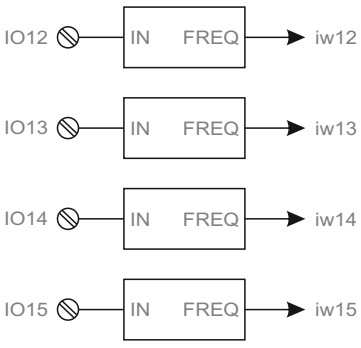



A, B - counter inputs
CNT - number of pulses
RST - reset

Counter value may lag up to 5ms to Cybro core. Also, reset command from core to counter may lag another 5ms.

## Frequency meter

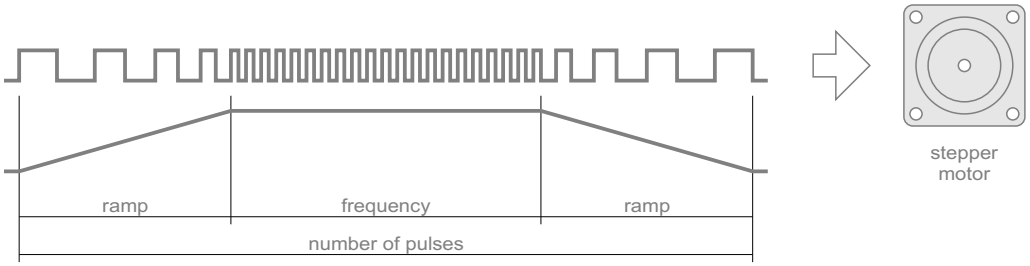


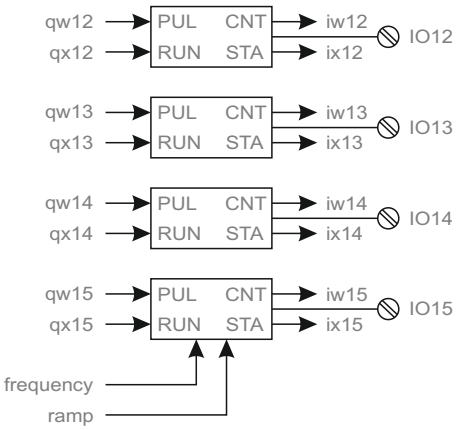




IN - counter input
FREQ - measured frequency [Hz]

Pulses are counted with a period of 1000ms.

## Pulse train output

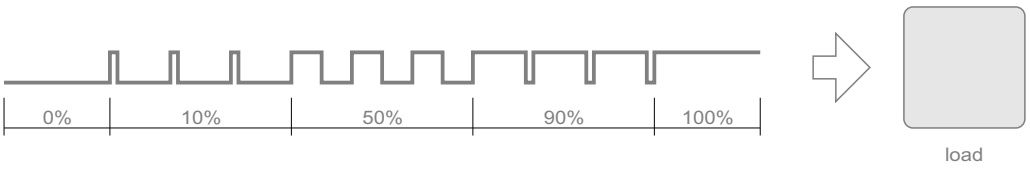


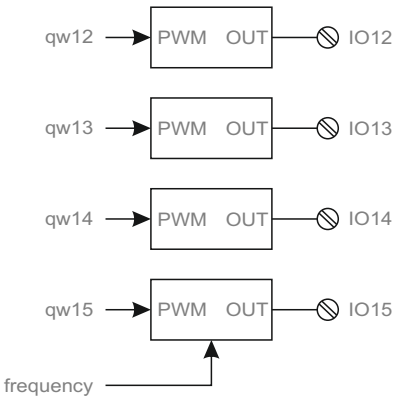




PUL - number of pulses requested
RUN - start signal (1-run)
CNT - number of pulses counted
STA - status (0-stop, 1-running)

Frequency and ramp are sampled when pulse train is started. After the run request is cleared, changes does not affect the output. That given, each channel can run on it's own frequency.

## PWM output

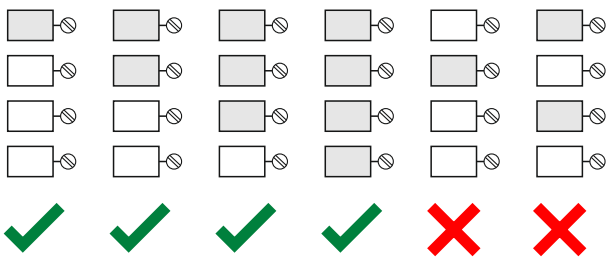



PWM - pulse width 0..100%
OUT - output terminal

A single frequency setting is common for all outputs [Hz].

Unlike other modes, PWM outputs must be assigned in ascending order, IO12 to IO15. If there is one PWM output, it must be IO12. Two must be IO12 and IO13, three must be IO12, IO13 and IO14. Any other combination is invalid and it will produce no output.



# Technical specifications

### Digital input (ix00..ix11)

| | |
|---|---|
| Input type | 24V 7mA, opto isolated, bidirectional |
| Debounce filter | 1ms (5x 200us) |
| Sampling time | 5ms |
| Galvanic isolation | 230V IX to 24V supply, optocoupler |

### Digital output (qx00..qx09)

| | |
|---|---|
| Output type | relay 8A/250VAC or 8A/30VDC resistive |
| Contact type | normally open |
| Continuous load | 6A each relay<br>10A common terminal two relays<br>25A all relays |
| Recommended fuse | 6A MCB type B each relay<br>10A MCB type B common terminal two relays |
| Galvanic isolation | 4kV QX to 24V supply<br>230V QX0/1 to QX2/3, QX4/5 to QX6/7 to QX8/9 |

### CPU board

| | |
|---|---|
| System clock | 100MHz, 10ns per instruction |
| Watch dog | 100ms software, 250ms hardware |
| Program memory | 896Kb for user program |
| Data memory | 64Kb for user variables |
| Data retention | 7 days at 25°C |
| RTC accuracy | typ. ±2 sec per day at 25°C |
| Supply measurement | 0..42V, typ. ±1% of full scale |
| Internal temperature | -50..150°C, ±5°C, on CPU board |

### COM1/COM2

| | |
|---|---|
| Type | RS232 |
| Galvanic isolation | none |
| Cable length | 10m |
| Connector | RJ9 |
| Protocol | A-bus slave<br>Modbus RTU slave<br>free programmable |

### USB

| | |
|---|---|
| Type | USB 2.0 |
| Profile | USB-SERIAL CH340 |
| Galvanic isolation | none |
| Connector | micro USB type B |
| Power supply | 5V 100mA, only for CPU |
| Protocol | A-bus slave |

### Ethernet

| | |
|---|---|
| Type | 10/100M |
| Auto-MDIX | no |
| Galvanic isolation | 1500V transformer |
| Connector | RJ45 |
| Protocol | A-bus slave<br>Modbus TCP slave |

### IEX-2

| | |
|---|---|
| Bus load | 48 modules (Cybro + 47 IEX-2) |
| Baudrate | 20, 50, 100 (default), 250, 500kbps |
| Galvanic isolation | none |
| Cable length | 100m (100kbps, non-terminated)<br>300m (100kbps, terminated)<br>500m (50kbps, terminated) |
| Connector | RJ9 |
| Protocol | IEX-2 master (CAN 2.0B)<br>A-bus slave |

### General

| | |
|---|---|
| Operating conditions | 0..50°C, 0..85% rh non-condensing |
| Storage temperature | -40..85°C |
| Level of ambient pollution | 2 |
| Power supply | 24V (18..28V) |
| Power consumption | 50mA (no load)<br>180mA (10 relays, 4x 10Vout) |
| IEX-2 power output | 24V 2A (limited by resettable fuse) |
| Resettable fuse trip time | 10s at 200% overload |
| Resettable fuse recover time | 48 hours with power off |
| Resettable fuse life | 100 cycles |
| | |
| Terminals | 2.5mm2, 15A, removable |
| Mounting | DIN rail (35mm) |
| Dimensions | 106x117x58mm |
| Weight | 280g |
| Degree of protection | IP20 |
| Installation category | III |
| Standards | EN 61010-1, EN 61010-2-201, EN 61131-2 |

# Universal input/output

### Digital input (ix12..ix15)

| | |
|---|---|
| Input type | dry contact, internal pull-up 12V 3mA |
| Debounce filter | 1ms (5x 200us) |
| Sampling time | 5ms |
| Galvanic isolation | none |

### Digital output (qx12..qx15)

| | |
|---|---|
| Output type | NPN transistor 30V 1A |
| Permanent load | 1.5A qx12+qx13 and 1.5A qx14+qx15 |
| Protection | short circuit, overvoltage, overheating |
| Leakage current | 250uA |
| Galvanic isolation | none |

### Analog input 0..10V (iw12..iw15)

| | |
|---|---|
| Input type | 0..10V |
| Measuring range | 0..14V |
| Resolution | 12 bits |
| Readout | mV (10V=10000) |
| Input resistance | 100 kohm |
| Accuracy | typ. ±1% of full scale at 25°C |
| Temperature drift | 50ppm/°C |
| Galvanic isolation | none |
| Sampling time | 10ms |

### Analog input 4..20mA (iw12..iw15)

| | |
|---|---|
| Input type | 4..20mA |
| Measuring range | 0..24mA |
| Resolution | 12 bits |
| Readout | uA (20mA=20000) |
| Input resistance | 250 ohm |
| Accuracy | typ. ±1% of full scale at 25°C |
| Temperature drift | 100ppm/°C |
| Galvanic isolation | none |
| Sampling time | 10ms |

### Analog output 0..10V (qw12..qw15)

| | |
|---|---|
| Output type | 0..10V |
| Output range | 0..10.2V |
| Resolution | 12 bits |
| Readout | mV (10V=10000) |
| Output current | 10mA sink/source |
| Accuracy | typ. ±1% of full scale at 25°C |
| Temperature drift | 50ppm/°C |
| Galvanic isolation | none |
| Settling time | 10ms |

### Temperature sensor (iw12..iw15)

| | |
|---|---|
| Input type | ES digital sensor (DS18B20) |
| Connection protocol | 1-wire digital thermometer |
| Measuring range | -50..+125°C |
| Resolution | 12 bits (750ms conversion time) |
| Readout | 0.1°C (245=24.5°C) |
| Accuracy | typ. ±0.2°C, max. ±0.5°C (-10°C to +85°C) |
| Cable length | 20m |
| Recommended cable | UTP 0.25..0.5mm2 |

### High speed counter (iw12..iw15, qx12..qx15)

| | |
|---|---|
| Type | single phase (up) or dual phase (up/down) |
| Counting resolution | 1x (single phase) or 4x (dual phase) |
| Maximum frequency | 5kHz with 50% duty cycle |
| Counter size | 16-bit (-32768..32767) |
| Electrical characteristics | internal pull-up 3.3V 2mA, 24V tolerant |

### Frequency meter (iw12..iw15)

| | |
|---|---|
| Frequency range | 0..5kHz with 50% duty cycle |
| Integration time | 1000ms |
| Electrical characteristics | internal pull-up 3.3V 2mA, 24V tolerant |

### Pulse train output (qw12..qw15, qx12..qx15, ix12..ix15)

| | |
|---|---|
| Frequency range | 20Hz..2.5kHz |
| Acceleration/deceleration | 0..2500ms |
| Counter size | 16 bits (1..65535 pulses) |
| Electrical characteristics | same as universal digital output |

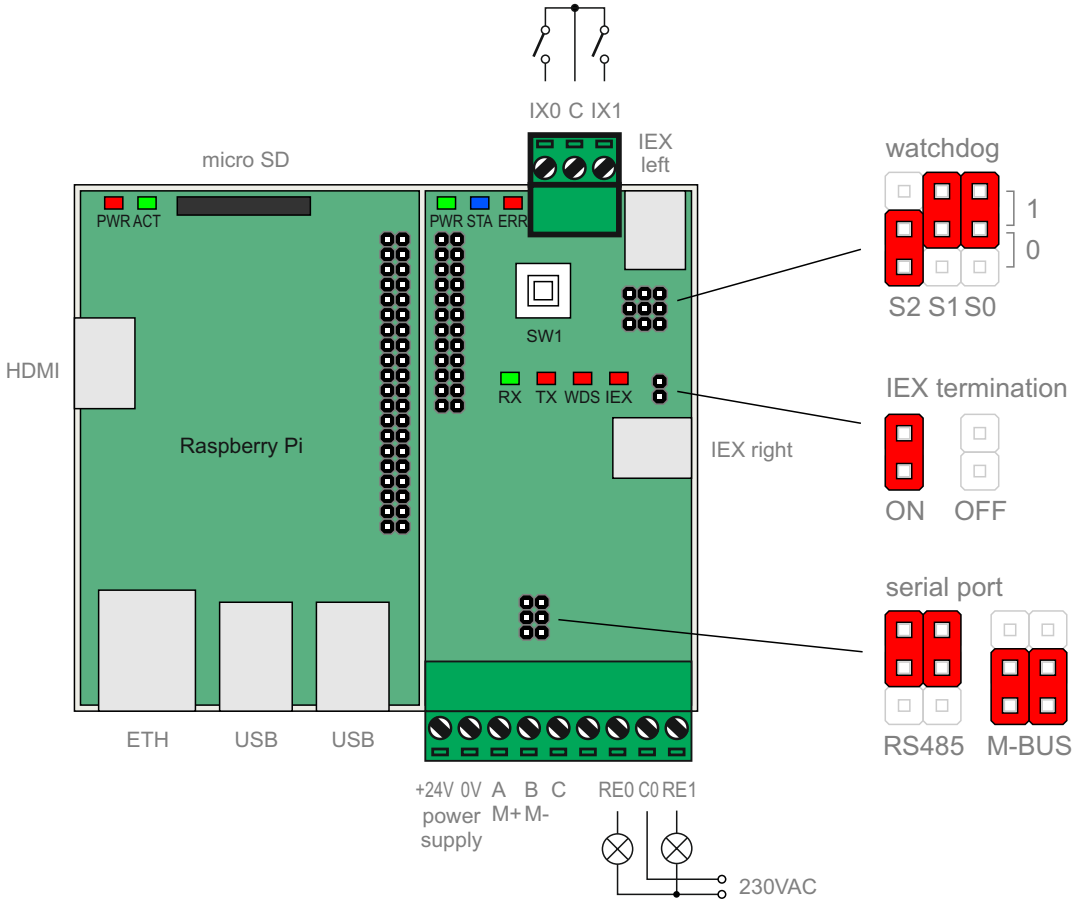
### PWM output (qw12..qw15)

| | |
|---|---|
| Duty cycle | 0..100% |
| Output resolution | 8 bits |
| Frequency range | 20Hz..2.5kHz |
| Electrical characteristics | same as universal digital output |

# Cybro-Pi3

Raspberry Pi 3B+
PiCAN2 controller
watchdog timer
RS485/M-bus serial driver
24-to-5V voltage regulator
1 pushbutton
2 digital inputs
2 relay outputs 8A

building



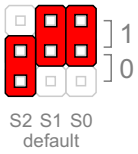

## Input/output mapping

| | | | | |
|---|---|---|---|---|
| PWR | power supply | +5V | - | connected to +5V power supply |
| STA | device status | GPIO2/SDA | 0-active | digital output, controlled by user application |
| ERR | device error | GPIO3/SCL | 0-active | digital output, controlled by user application |
| RX | serial receive | GPIO15/RXD | 0-active | controled by primary UART (/dev/serial0) |
| TX | serial transmit | GPIO14/TXD | 0-active | controled by primary UART (/dev/serial0) |
| WDS | watchdog signal | GPIO27 | 0-active | digital output, controlled by user application |
| IEX | CAN bus activity | CANH/CANL | 0-active | controlled by CAN controller (SPI0/CAN0) |
| SW1 | push button | GPIO4 | 0-pressed | digital input, readable by user application |
| IX0 | digital input | GPIO17 | 0-closed | digital input, readable by user application |
| IX1 | digital input | GPIO18 | 0-closed | digital input, readable by user application |
| RE0 | relay output | GPIO23 | 1-active | digital output, controlled by user application |
| RE1 | relay output | GPIO24 | 1-active | digital output, controlled by user application |

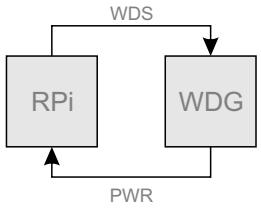
## Watchdog settings

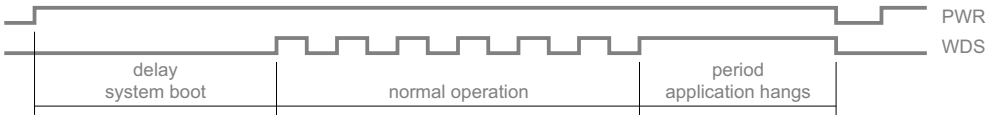
Watchdog is hardware device used for monitoring your application. Application must send a continuous stream of pulses on WDS line. When pulse is missing, watchdog will reset your Raspberry. This prevents application to permanently lock up, for any reason.

Watchdog can be activated by the first WDS edge, or 60 seconds after power on. Period is configured between one pulse per second, or one pulse per 10 seconds. Minimum pulse width is 100ns, maximum frequency is not limited.

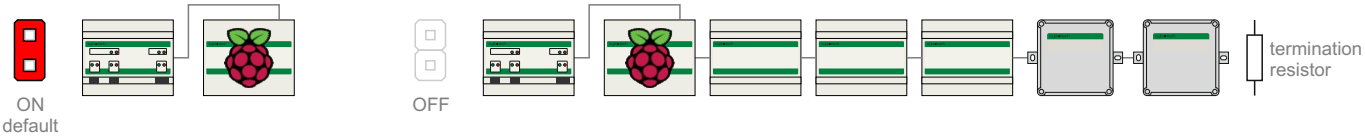



| SET2 | SET1 | SET0 | delay | period | description |
|---|---|---|---|---|---|
| 0 | 1 | 1 | - | - | disabled |
| 1 | 0 | 1 | first edge | 1s | - |
| 1 | 1 | 0 | first edge | 10s | development |
| 0 | 1 | 0 | 60s | 1s | - |
| 1 | 1 | 1 | 60s | 10s | production |



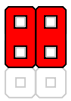




## IEX termination

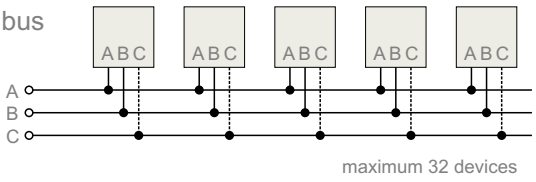


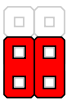

When termination resistor is connected at the end of the CAN line, jumper must be in OFF position.

## Serial port (/dev/serial0)

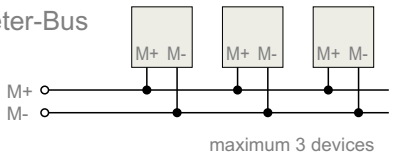



Modbus




Meter-Bus

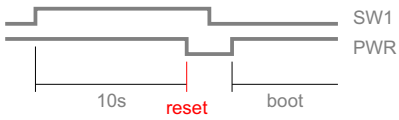



## Push button

short press


user-defined action
handled by user application

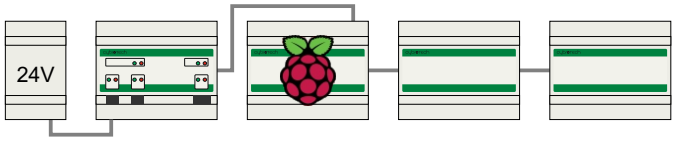
long press (10s)
keep pressed until PWR blinks



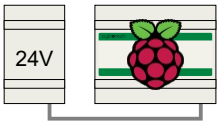

hard reset
handled by power supply hardware

Push button is accessable using a small 2mm screwdriver. It can be used to start a custom action (short press), or to reset device (long press).

## Configuration

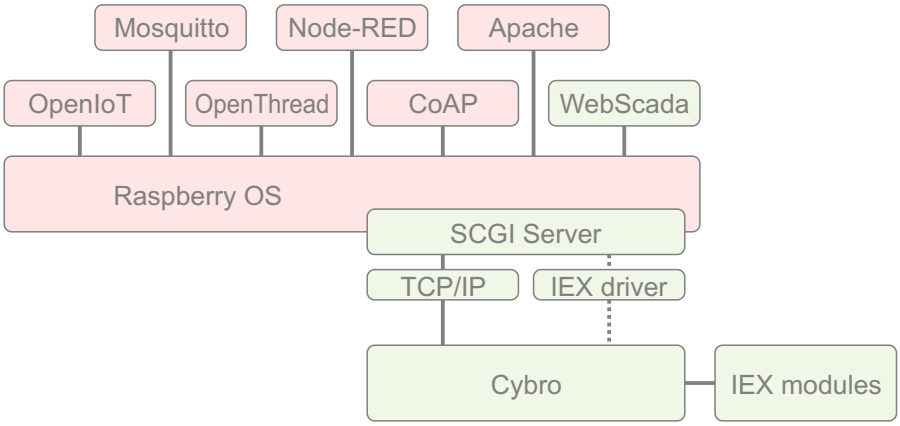



Raspberry, Cybro and IEX modules




Raspberry alone

## Application examples

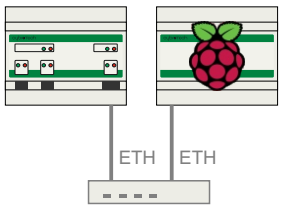



Combine the abundance of Raspberry projects with reliability of Cybro controller and expansion modules

* IEX driver will be available soon

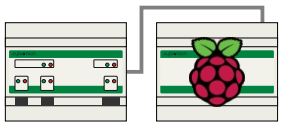
## Raspberry-to-Cybro connection

### 1. TCP/IP




Raspberry can read and write Cybro variables through local TCP/IP network.

### 2. CAN



Integrated CAN controller enables Raspberry to read and write Cybro variables through IEX bus.

## Quick start

1. Choose OS, write RPi bootable image on uSD
2. Connect power supply and communication
3. Install SCGI server and (optionally) web scada
4. Install Raspberry project you are interested in
5. Write code to integrate Cybro into your project

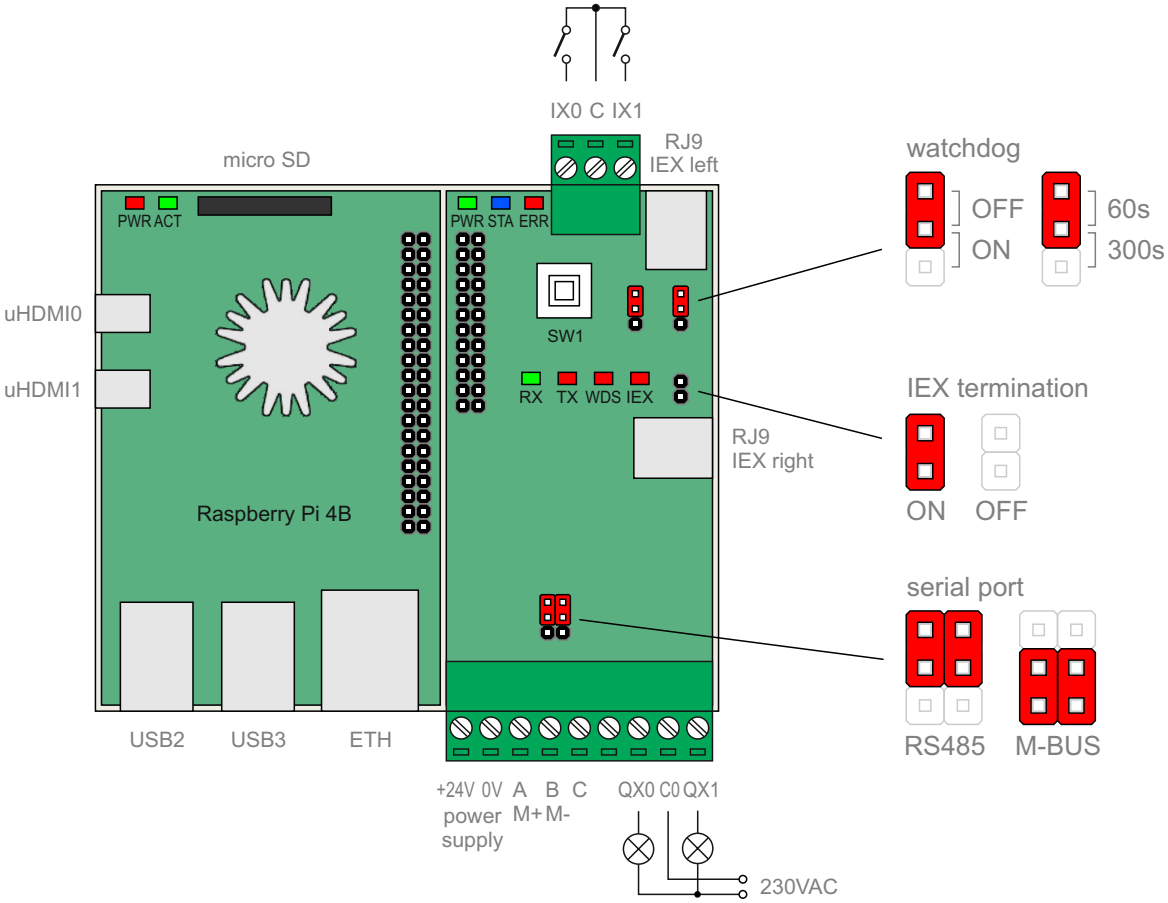
## Technical specifications

| | |
|---|---|
| Input type | dry contact, internal pull-up 12V 2mA |
| Galvanic isolation | none |
| Output type | relay 8A/250VAC resistive, normally open |
| Continuous load | 6A each relay<br>10A both relays |
| Galvanic isolation | 4kV, relay contact to 24V power supply |
| Power supply | 24V (18..28V), 120mA typ., 400mA max. |
| Mounting | DIN rail (35mm) |
| Dimensions | 106x117x32mm |
| Weight | 185g |
| Degree of protection | IP20 |

# Cybro-Pi4

building

Raspberry Pi 4B 2Gb
hardware watchdog timer
PiCAN2 compatible controller
RS485/M-bus serial interface
24-to-5V voltage regulator
CPU heatsink
1 pushbutton
2 digital inputs
2 relay outputs 8A




## Input/output mapping

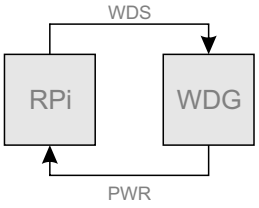
| | | | | |
|---|---|---|---|---|
| PWR | power supply | +5V | - | connected to +5V power supply |
| STA | device status | GPIO2/SDA | 0-active | digital output, controlled by user application |
| ERR | device error | GPIO3/SCL | 0-active | digital output, controlled by user application |
| RX | serial receive | GPIO15/RXD | 0-active | controled by primary UART (/dev/serial0) |
| TX | serial transmit | GPIO14/TXD | 0-active | controled by primary UART (/dev/serial0) |
| WDS | watchdog signal | GPIO27 | 0-active | digital output, controlled by user application |
| IEX | CAN bus activity | CANH/CANL | 0-active | controlled by CAN controller (SPI0/CAN0) |
| SW1 | push button | GPIO4 | 0-pressed | digital input, readable by user application |
| IX0 | digital input | GPIO17 | 0-closed | digital input, readable by user application |
| IX1 | digital input | GPIO18 | 0-closed | digital input, readable by user application |
| RE0 | relay output | GPIO23 | 1-active | digital output, controlled by user application |
| RE1 | relay output | GPIO24 | 1-active | digital output, controlled by user application |

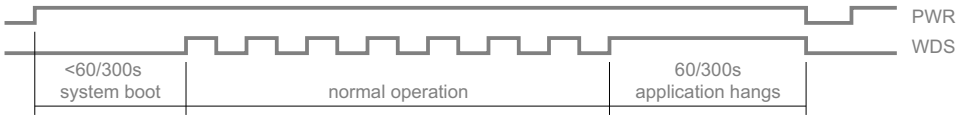
## Watchdog settings

Watchdog is hardware device for monitoring your application. Application sends a continuous stream of pulses on WDS line. When pulsing is stopped for any reason, watchdog will reset the Raspberry, preventing application to permanently lock up.

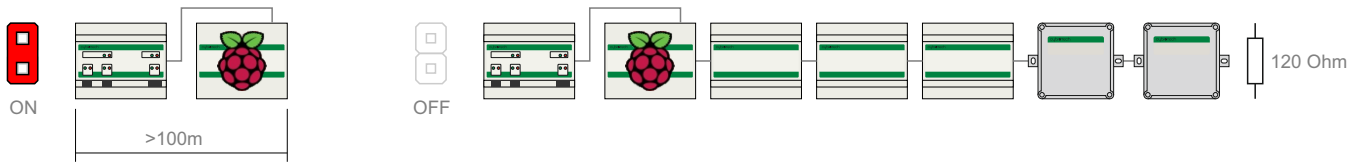
Watchdog can be configured to 60 or 300 seconds, depending on boot time. Default is disabled. Minimum WDS pulse width is 500+500us, recommended width is 500+500ms.


| JP1 | JP0 | period | description |
|---|---|---|---|
| OFF | - | - | watchdog disabled |
| ON | 60s | 60s | watchdog enabled |
| ON | 300s | 300s | watchdog enabled |



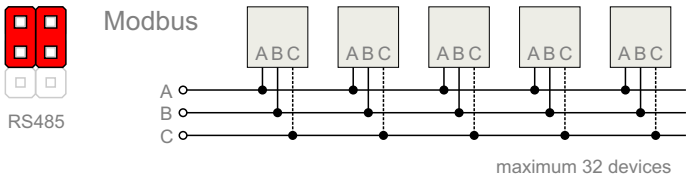



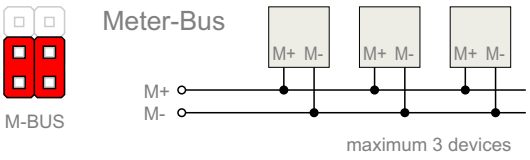

## IEX termination



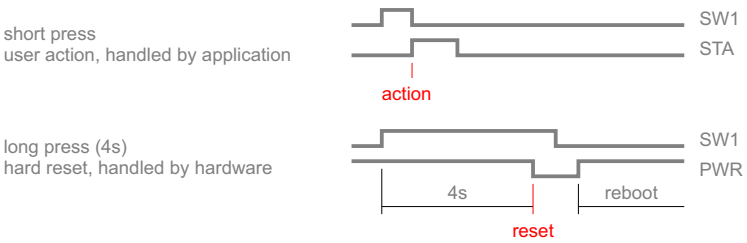

When termination resistor is already connected at the end of the line, jumper must be in OFF position. When line is shorter ther 100m, termination doesn't matter.

## Serial port (/dev/serial0)



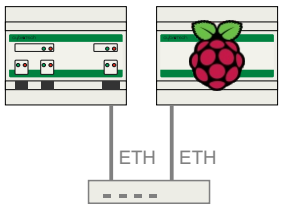

## Push button




Push button is accessable using a small 2mm screwdriver. It can be used to start an action (short press), or to reboot Raspberry Pi (long press).

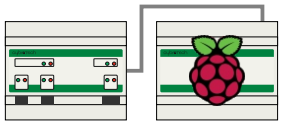
## Raspberry-Cybro connection

### 1. TCP/IP



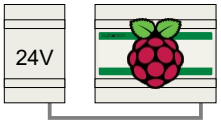

Raspberry read and write Cybro variables through local TCP/IP network

### 2. IEX/CAN

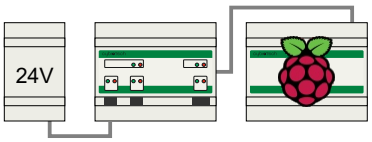


Raspberry read and write Cybro variables through IEX bus, using the integrated CAN controller

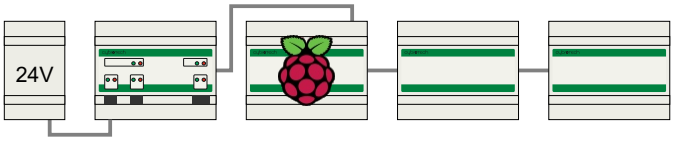
## Power supply




Raspberry alone

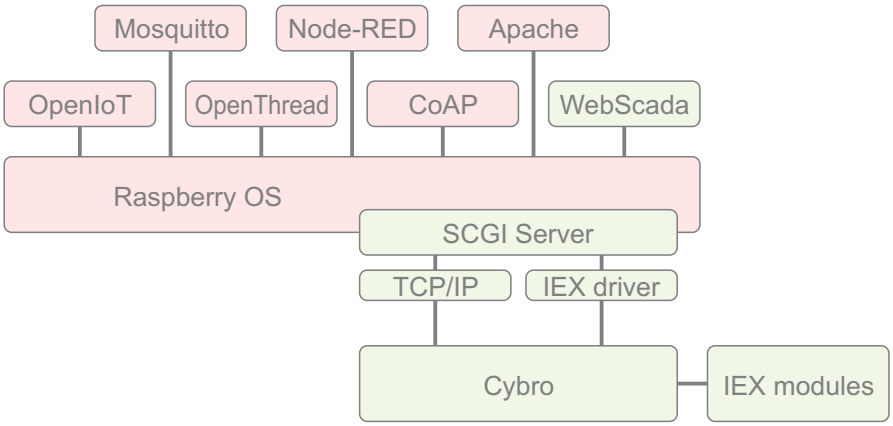



Raspberry and Cybro




Raspberry, Cybro and IEX modules

## Possible applications




Combine the abundance of Raspberry projects with reliability of Cybro controller and expansion modules

## Quick start

1. Choose OS, write RPi bootable image on uSD
2. Connect power supply and communication
3. Install SCGI server and (optionally) web scada
4. Install Raspberry project you are interested in
5. Write code to integrate Cybro into the project

## CPU heatsink

Internal heatsink brings the CPU temperature down, providing longevity and reliable operation. However, when CPU is fully loaded, external cooling fan may be needed to prevent thermal trottling.

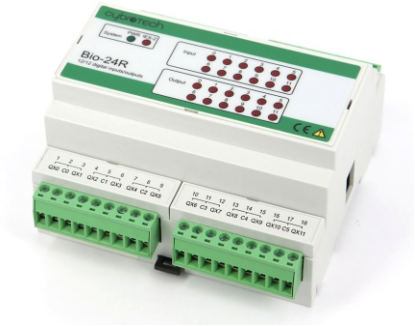
## Technical specifications

| | |
|---|---|
| Input type | dry contact, internal pull-up 12V 2mA |
| Galvanic isolation | none |
| Output type | relay 8A/250VAC resistive, normally open |
| Continuous load | 6A each relay<br>10A both relays |
| Galvanic isolation | 4kV, relay contact to 24V power supply |
| Power supply | 24V (18..28V), 120mA typ., 400mA max. |
| Mounting | DIN rail (35mm) |
| Dimensions | 106x117x32mm |
| Weight | 200g |
| Degree of protection | IP20 |

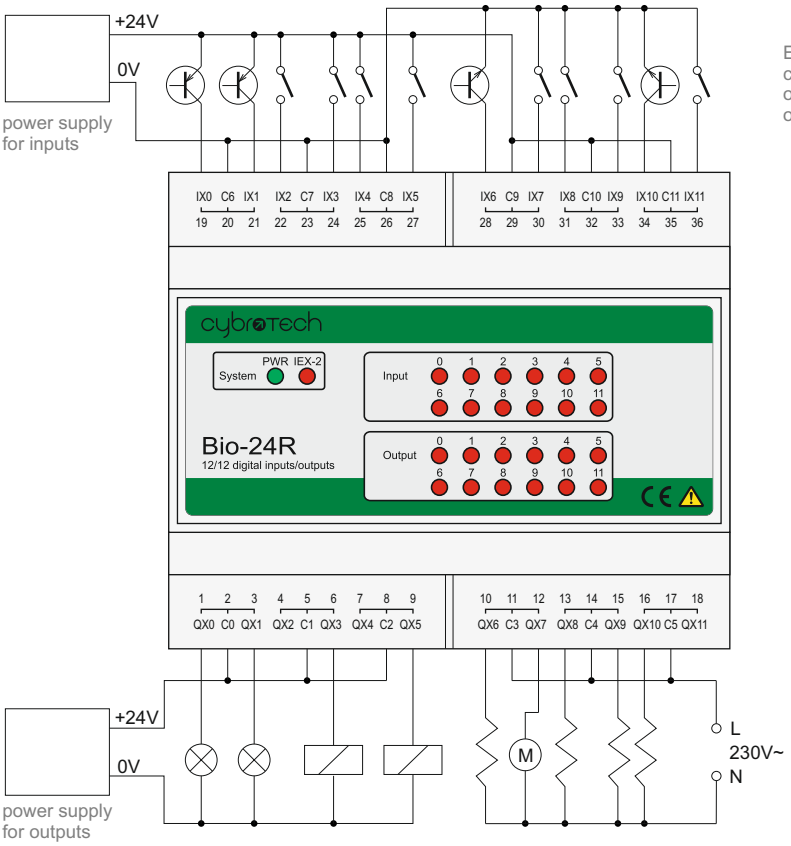
# Bio-24R

IEX-2 module
12 opto-coupler inputs 24V
12 relay outputs 5A

industrial building



## Wiring diagram




Each group of two inputs (IX0/1, IX2/3...) can be connected as either common GND or common +24V. Wiring diagram shows only one of possible combinations.

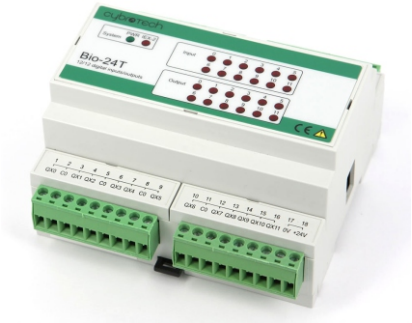
## Technical specifications

| | |
|---|---|
| Input type | 24V 7mA, opto isolated, bidirectional |
| Debounce filter | 0, 5 or 100ms, software selectable |
| Output type | relay 5A/250VAC or 3A/30VDC resistive |
| Contact type | normally open |
| Continuous load | 3A each relay<br>36A all relays |
| Power supply | 24V (18..28V), 260mA<br>(20mA+11mA*active outputs+9mA*active inputs) |
| Galvanic isolation | 4kV between inputs and internal circuit<br>4kV relay contact |
| Operating conditions | 0..50°C, 0..85% rh non-condensing |
| Mounting | DIN rail (35mm) |
| Dimensions | 106x117x58mm |
| Weight | 320g |
| Degree of protection | IP20 |
| Installation category | II |
| Level of ambient pollution | 2 |
| Standards | EN 61010-1, EN 61010-2-201, EN 61131-2 |

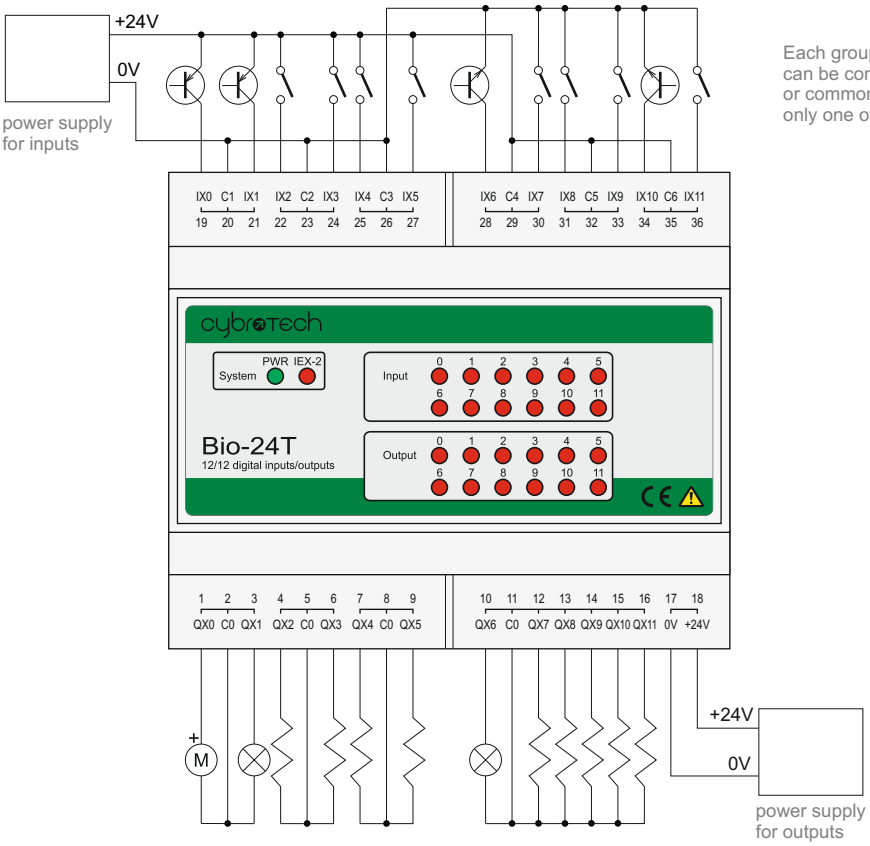
# Bio-24T

IEX-2 module
12 opto-coupler inputs 24V
12 opto-isolated PNP outputs 1A

industrial building



## Wiring diagram




Each group of two inputs (IX0/1, IX2/3...) can be connected as either common GND or common +24V. Wiring diagram shows only one of possible combinations.

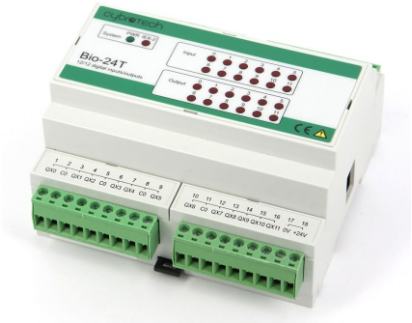
## Technical specifications

| | |
|---|---|
| Input type | 24V 7mA, opto isolated, bidirectional |
| Debounce filter | 0, 5 or 100ms, software selectable |
| Output type | PNP transistor 30V 1A |
| Protection | short circuit, overcurrent and reverse supply |
| Power supply | 24V (18..28V), 80mA |
| Galvanic isolation | 4kV between inputs and internal circuit<br>4kV between internal circuit and output transistors |
| Operating conditions | 0..50°C, 0..85% rh non-condensing |
| Mounting | DIN rail (35mm) |
| Dimensions | 106x117x58mm |
| Weight | 270g |
| Degree of protection | IP20 |
| Installation category | II |
| Level of ambient pollution | 2 |
| Standards | EN 61010-1, EN 61010-2-201, EN 61131-2 |

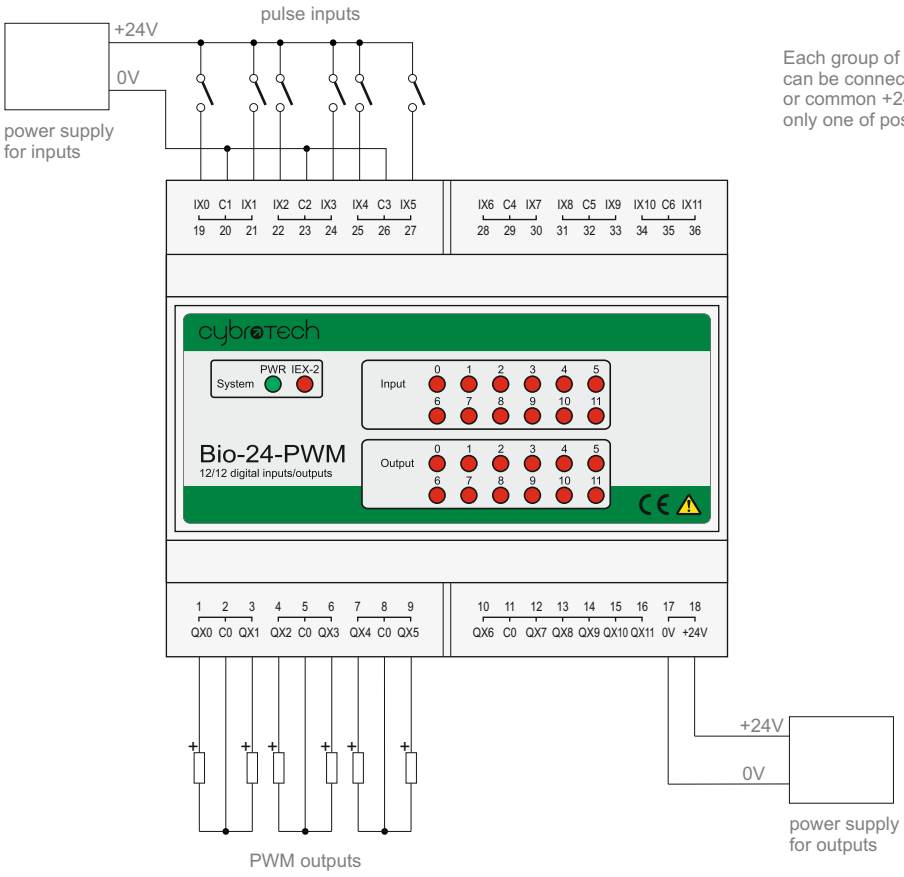
# Bio-24PWM

IEX-2 module
12 opto-coupler inputs 24V (4 pulse counters)
12 opto-isolated PNP outputs 1A (6 PWM outputs)

industrial building



## Wiring diagram




Each group of two inputs (IX0/1, IX2/3...) can be connected as either common GND or common +24V. Wiring diagram shows only one of possible combinations.

## Technical specifications

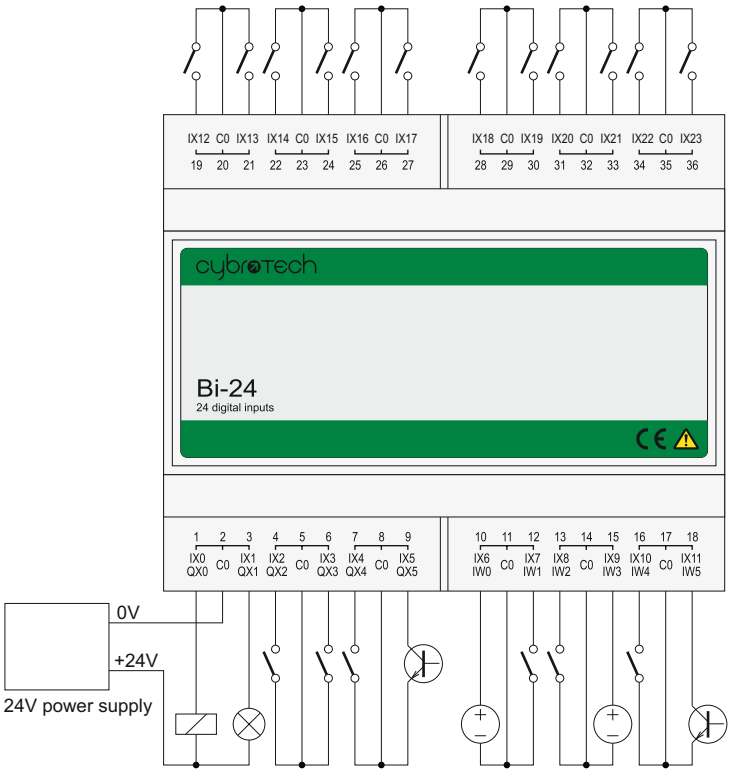
| | |
|---|---|
| Input type | 24V 7mA, opto isolated, bidirectional |
| Pulse counter | IX0..IX3 (4 independent counters) |
| Input frequency | max. 1kHz, 50% duty cycle |
| Output type | PNP transistor 30V 1A |
| Protection | overload, short circuit and reverse supply |
| PWM outputs | QX0..QX5 (6 independent outputs) |
| PWM frequency | 250Hz or 500Hz, software selectable |
| PWM range | 0..100% in 40 steps (250Hz), 0..100% in 20 steps (500Hz) |
| Power supply | 24V (18..28V), 80mA |
| Galvanic isolation | 4kV between inputs and internal circuit<br>4kV between internal circuit and output transistors |
| Operating conditions | 0..50°C, 0..85% rh non-condensing |
| Mounting | DIN rail (35mm) |
| Dimensions | 106x117x58mm |
| Weight | 270g |
| Degree of protection | IP20 |
| Installation category | II |
| Level of ambient pollution | 2 |
| Standards | EN 61010-1, EN 61010-2-201, EN 61131-2 |

# Bi-24

IEX-2 module
6 digital inputs or NPN outputs 1A
6 digital or analog inputs
12 digital inputs

building

## Wiring diagram




All common terminals are internally connected to GND. Wiring diagram is an example, it shows only one of possible combinations.

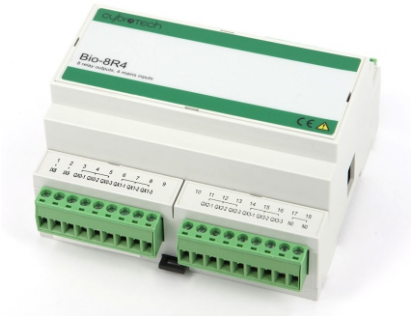
## Technical specifications

| | |
|---|---|
| Input type | dry contact, internal pull-up 12V 2mA |
| Debounce filter | 15ms (30Hz max readout) |
| Analog input | 0..10V 6kohm |
| Resolution | 10 bits (0..1023) |
| Accuracy | typ. 2% of FSR at 25°C |
| Output type | NPN transistor 1A 30V |
| Protection | short circuit, overcurrent, voltage clamp |
| Power supply | 24V (18..28V), 60mA |
| Galvanic isolation | none |
| Operating conditions | 0..50°C, 0..85% rh non-condensing |
| Mounting | DIN rail (35mm) |
| Dimensions | 106x117x58mm |
| Weight | 250g |
| Degree of protection | IP20 |
| Level of ambient pollution | 2 |
| Standards | EN 60730-1 |

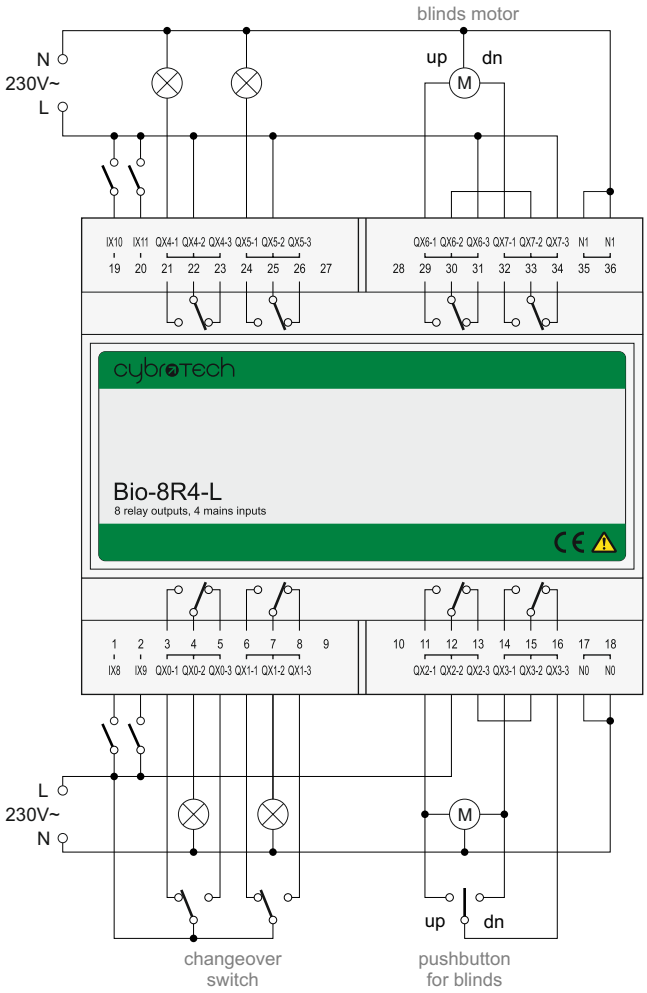
# Bio-8R4

IEX-2 module
4 opto-coupler inputs 230V
8 relay outputs 16A with mains sense

industrial building



## Wiring diagram




Mains sense is connected to the relay common contact. Wiring diagram is an example, it shows only one of possible combinations.

## Technical specifications

| | |
|---|---|
| Input type | 230VAC 1mA, opto isolated |
| Output type | relay 16A/250VAC resistive |
| Continuous load | 15A per relay<br>75A for all relays together |
| Power supply | 24V (18..28V), 160mA<br>(20mA+17mA*number of active relays) |
| Galvanic isolation | 5kV between inputs and internal circuit<br>5kV between internal circuit and relay contacts |
| Operating conditions | 0..50°C, 0..85% rh non-condensing |
| Mounting | DIN rail (35mm) |
| Dimensions | 106x117x58mm |
| Weight | 360g |
| Degree of protection | IP20 |
| Level of ambient pollution | 2 |
| Standards | EN 61010-1, EN 61010-2-201, EN 61131-2 |

## Order code

| | |
|---|---|
| Bio-8R4-L | power relay for lights and blinds |

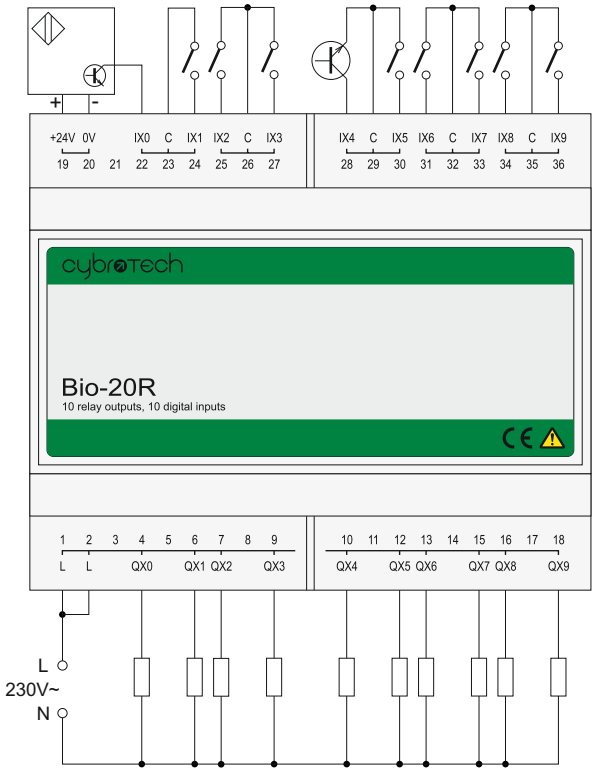
# Bio-20R

IEX-2 module
10 digital inputs
10 relay outputs 8A

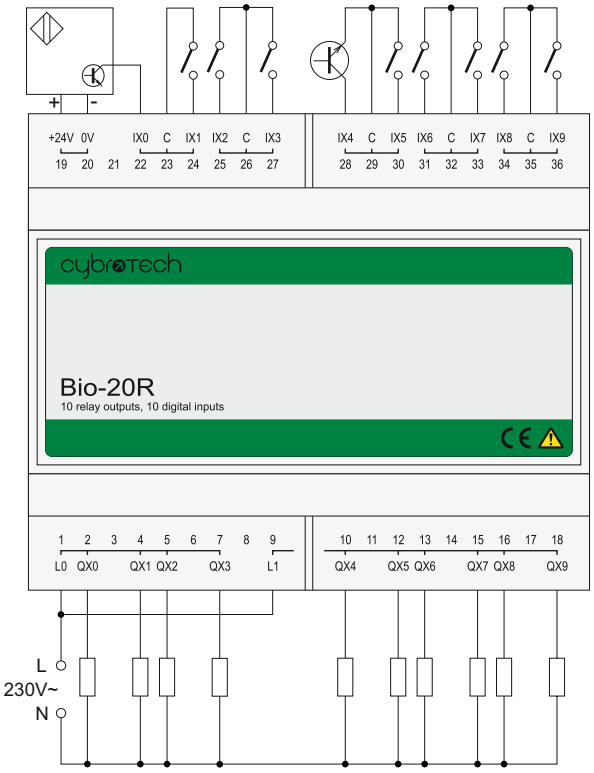
building

## Wiring diagram

### mk1 or no revision marking




### mk2




## Technical specifications

| | |
|---|---|
| Input type | dry contact, internal pull-up 12V 2mA |
| Output type | relay 8A/250VAC or 8A/30VDC resistive |
| Contact type | normally open |
| Continuous load | 6A each relay<br>20A all relays (mk1)<br>12A each relay group (mk2) |
| Power supply | 24V (18..28V), 120mA<br>(30mA+9mA*number of active outputs) |
| Galvanic isolation | 4kV between internal circuit and relay contact |
| Operating conditions | 0..50°C, 0..85% rh non-condensing |
| Mounting | DIN rail (35mm) |
| Dimensions | 106x117x58mm |
| Weight | 300g |
| Degree of protection | IP20 |
| Level of ambient pollution | 2 |
| Standards | EN 60730-1 |

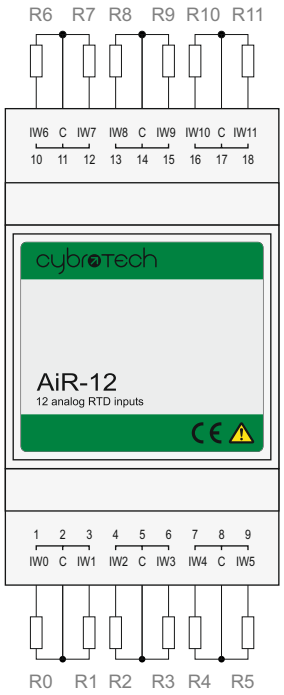
# AiR-12

IEX-2 module
12 RTD inputs

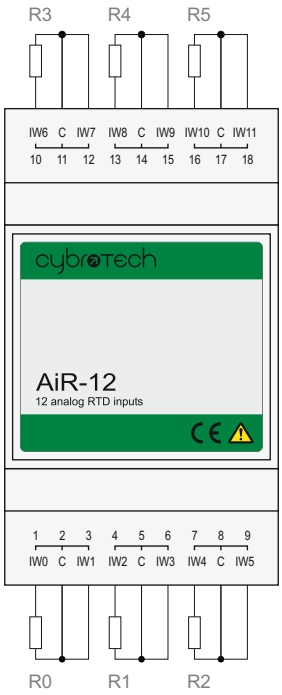
industrial building

## Wiring diagram

### 2-wire




### 3-wire




## Terminals

| No | Name | Description |
|---|---|---|
| 1 | IW0 | iw000 |
| 2 | C | common for iw000 & iw001 |
| 3 | IW1 | iw001 |
| 4 | IW2 | iw002 |
| 5 | C | common for iw002 & iw003 |
| 6 | IW3 | iw003 |
| 7 | IW4 | iw004 |
| 8 | C | common for iw004 & iw005 |
| 9 | IW5 | iw005 |
| 10 | IW6 | iw006 |
| 11 | C | common for iw006 & iw007 |
| 12 | IW7 | iw007 |
| 13 | IW8 | iw008 |
| 14 | C | common for iw008 & iw009 |
| 15 | IW9 | iw009 |
| 16 | IW10 | iw010 |
| 17 | C | common for iw010 & iw011 |
| 18 | IW11 | iw011 |

## Technical specifications

In 3-wire mode, temperature is iw0, iw2, iw4, iw6, iw8 and iw10; wire resistance is iw1, iw3, iw5, iw7, iw9 and iw11.

For a best accuracy, unused inputs must be short-circuited.

If measurement is invalid, check variable program_error. Active means either program or calibration data is corrupted.

| | |
|---|---|
| Input type | Pt100/1000 (DIN751) auto selectable, measuring range -100..300°C<br>Ni100/1000 (DIN43760) auto selectable, measuring range -50..160°C<br>Ni100/1000 (Landis & Gyr) auto selectable, measuring range -50..160°C<br>potentiometer 0..2000ohm |
| Sensor current | 190uA (each sensor) |
| Wire resistance | 20ohm max. (3-wire mode) |
| Resolution | 14 bits in 0.1% mode<br>12 bits in 0.5% and 1% mode |
| Temperature drift | +/-0.01%/°C of measuring range |
| Calibration reference | 150.00ohm, 1500.0ohm |

Input mode

| mode | no.ch | connection | accuracy | scan time | integration time | auto calibration |
|---|---|---|---|---|---|---|
| 0 | 12 | 2-wire | 0.1% | 1120ms | 60ms | each cycle |
| 1 | 12 | 2-wire | 1% | 480ms | 20ms | each cycle |
| 2 | 12 | 2-wire | 5% | 360ms | 20ms | every 10 minutes |
| 3 | 6 | 2-wire | 0.1% | 700ms | 60ms | each cycle |
| 4 | 6 | 2-wire | 1% | 300ms | 20ms | each cycle |
| 5 | 6 | 2-wire | 5% | 180ms | 20ms | every 10 minutes |
| 6 | 4 | 2-wire | 0.1% | 560ms | 60ms | each cycle |
| 7 | 4 | 2-wire | 1% | 240ms | 20ms | each cycle |
| 8 | 4 | 2-wire | 5% | 120ms | 20ms | every 10 minutes |
| 9 | 2 | 2-wire | 0.1% | 420ms | 60ms | each cycle |
| 10 | 2 | 2-wire | 1% | 180ms | 20ms | each cycle |
| 11 | 2 | 2-wire | 5% | 60ms | 20ms | every 10 minutes |
| 12 | 1 | 2-wire | 0.1% | 350ms | 60ms | each cycle |
| 13 | 1 | 2-wire | 1% | 150ms | 20ms | each cycle |
| 14 | 1 | 2-wire | 5% | 30ms | 20ms | every 10 minutes |
| 15 | 6 | 3-wire | 0.1% | 1120ms | 60ms | each cycle |
| 16 | 3 | 3-wire | 0.1% | 700ms | 60ms | each cycle |
| 17 | 2 | 3-wire | 0.1% | 560ms | 60ms | each cycle |
| 18 | 1 | 3-wire | 0.1% | 420ms | 60ms | each cycle |

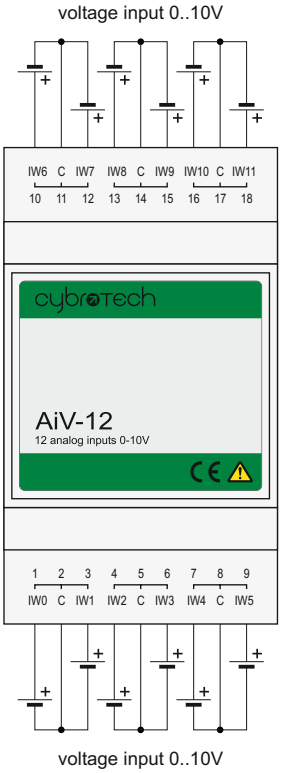
| | |
|---|---|
| Power supply | 24V (18..28V), 50mA |
| Galvanic isolation | 1kV beetwen digital and analog circuit<br>no isolation between chanels |
| Operating conditions | 0..50°C, 0..85% rh non-condensing |
| Mounting | DIN rail (35mm) |
| Dimensions | 53x117x58mm |
| Weight | 160g |
| Degree of protection | IP20 |
| Level of ambient pollution | 2 |
| Standards | EN 61010-1, EN 61010-2-201, EN 61131-2 |

# AiV-12

IEX-2 module
12 analog inputs 0..10V

industrial building

## Wiring diagram




## Terminals

| No | Name | Description |
|---|---|---|
| 1 | IW0 | iw000 |
| 2 | C | common for iw000 & iw001 |
| 3 | IW1 | iw001 |
| 4 | IW2 | iw002 |
| 5 | C | common for iw002 & iw003 |
| 6 | IW3 | iw003 |
| 7 | IW4 | iw004 |
| 8 | C | common for iw004 & iw005 |
| 9 | IW5 | iw005 |
| 10 | IW6 | iw006 |
| 11 | C | common for iw006 & iw007 |
| 12 | IW7 | iw007 |
| 13 | IW8 | iw008 |
| 14 | C | common for iw008 & iw009 |
| 15 | IW9 | iw009 |
| 16 | IW10 | iw010 |
| 17 | C | common for iw010 & iw011 |
| 18 | IW11 | iw011 |

## Technical specifications

| | |
|---|---|
| Input type | 0..10V |
| Input resistance | 10K |
| A/D converter | V/f conversion with auto calibration |
| Resolution | 13 bits in 0.1% mode<br>11 bits in 0.5% and 1% mode |
| Temperature drift | +-0.01%/°C of measuring range |
| Scan time | 30ms..980ms, depends on input mode |
| Integration time | 60ms/20ms, depends on input mode |
| Calibration reference | 10.000V |

Input mode

| mode | no.ch | accuracy | scan time | integration time | auto calibration |
|---|---|---|---|---|---|
| 0 | 12 | 0.1% | 980ms | 60ms | each cycle |
| 1 | 12 | 1% | 420ms | 20ms | each cycle |
| 2 | 12 | 5% | 360ms | 20ms | every 10 minutes |
| 3 | 6 | 0.1% | 560ms | 60ms | each cycle |
| 4 | 6 | 1% | 240ms | 20ms | each cycle |
| 5 | 6 | 5% | 180ms | 20ms | every 10 minutes |
| 6 | 4 | 0.1% | 420ms | 60ms | each cycle |
| 7 | 4 | 1% | 180ms | 20ms | each cycle |
| 8 | 4 | 5% | 120ms | 20ms | every 10 minutes |
| 9 | 2 | 0.1% | 280ms | 60ms | each cycle |
| 10 | 2 | 1% | 120ms | 20ms | each cycle |
| 11 | 2 | 5% | 60ms | 20ms | every 10 minutes |
| 12 | 1 | 0.1% | 210ms | 60ms | each cycle |
| 13 | 1 | 1% | 90ms | 20ms | each cycle |
| 14 | 1 | 5% | 30ms | 20ms | every 10 minutes |

| | |
|---|---|
| Power supply | 24V (18..28V), 50mA |
| Galvanic isolation | 1kV between digital and analog circuit<br>no isolation between chanels |
| Operating conditions | 0..50°C, 0..85% rh non-condensing |
| Mounting | DIN rail (35mm) |
| Dimensions | 53x117x58mm |
| Weight | 160g |
| Degree of protection | IP20 |
| Level of ambient pollution | 2 |
| Standards | EN 61010-1, EN 61010-2-201, EN 61131-2 |

# AiC-12

IEX-2 module
12 analog inputs 0..20mA

industrial building

## Wiring diagram


## Terminals

| No | Name | Description |
|---|---|---|
| 1 | IW0 | iw000 |
| 2 | C | common for iw000 & iw001 |
| 3 | IW1 | iw001 |
| 4 | IW2 | iw002 |
| 5 | C | common for iw002 & iw003 |
| 6 | IW3 | iw003 |
| 7 | IW4 | iw004 |
| 8 | C | common for iw004 & iw005 |
| 9 | IW5 | iw005 |
| 10 | IW6 | iw006 |
| 11 | C | common for iw006 & iw007 |
| 12 | IW7 | iw007 |
| 13 | IW8 | iw008 |
| 14 | C | common for iw008 & iw009 |
| 15 | IW9 | iw009 |
| 16 | IW10 | iw010 |
| 17 | C | common for iw010 & iw011 |
| 18 | IW11 | iw011 |

## Technical specifications

| | |
|---|---|
| Input type | 0..20mA |
| Input resistance | 50ohm |
| A/D converter | V/f conversion with auto calibration |
| Resolution | 13 bits in 0.1% mode<br>11 bits in 0.5% and 1% mode |
| Temperature drift | +-0.01%/°C of measuring range |
| Scan time | 30ms..980ms, depends on input mode |
| Integration time | 60ms/20ms, depends on input mode |
| Calibration reference | 10.000mA |

Input mode

| mode | no.ch | accuracy | scan time | integration time | auto calibration |
|---|---|---|---|---|---|
| 0 | 12 | 0.1% | 980ms | 60ms | each cycle |
| 1 | 12 | 1% | 420ms | 20ms | each cycle |
| 2 | 12 | 5% | 360ms | 20ms | every 10 minutes |
| 3 | 6 | 0.1% | 560ms | 60ms | each cycle |
| 4 | 6 | 1% | 240ms | 20ms | each cycle |
| 5 | 6 | 5% | 180ms | 20ms | every 10 minutes |
| 6 | 4 | 0.1% | 420ms | 60ms | each cycle |
| 7 | 4 | 1% | 180ms | 20ms | each cycle |
| 8 | 4 | 5% | 120ms | 20ms | every 10 minutes |
| 9 | 2 | 0.1% | 280ms | 60ms | each cycle |
| 10 | 2 | 1% | 120ms | 20ms | each cycle |
| 11 | 2 | 5% | 60ms | 20ms | every 10 minutes |
| 12 | 1 | 0.1% | 210ms | 60ms | each cycle |
| 13 | 1 | 1% | 90ms | 20ms | each cycle |
| 14 | 1 | 5% | 30ms | 20ms | every 10 minutes |

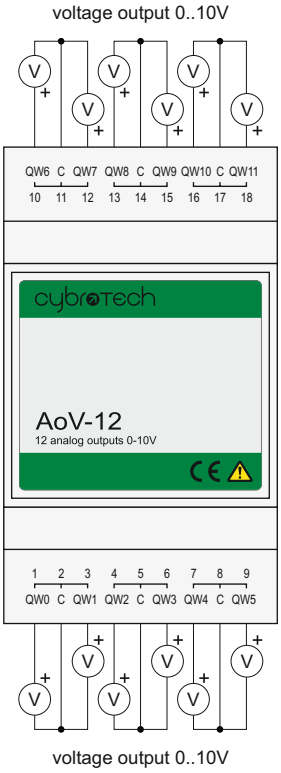
| | |
|---|---|
| Power supply | 24V (18..28V), 50mA |
| Galvanic isolation | 1kV between digital and analog circuit<br>no isolation between chanels |
| Operating conditions | 0..50°C, 0..85% rh non-condensing |
| Mounting | DIN rail (35mm) |
| Dimensions | 53x117x58mm |
| Weight | 160g |
| Degree of protection | IP20 |
| Level of ambient pollution | 2 |
| Standards | EN 61010-1, EN 61010-2-201, EN 61131-2 |

# AoV-12

IEX-2 module
12 analog outputs 0..10V

industrial building

## Wiring diagram




## Terminals

| No | Name | Description |
|---|---|---|
| 1 | QW0 | qw000 |
| 2 | C | common for qw000 & qw001 |
| 3 | QW1 | qw001 |
| 4 | IW2 | qw002 |
| 5 | C | common for qw002 & qw003 |
| 6 | QW3 | qw003 |
| 7 | QW4 | qw004 |
| 8 | C | common for qw004 & qw005 |
| 9 | QW5 | qw005 |
| 10 | QW6 | qw006 |
| 11 | C | common for qw006 & qw007 |
| 12 | QW7 | qw007 |
| 13 | QW8 | qw008 |
| 14 | C | common for qw008 & qw009 |
| 15 | QW9 | qw009 |
| 16 | QW10 | qw010 |
| 17 | C | common for qw010 & qw011 |
| 18 | QW11 | qw011 |

## Technical specifications

| | |
|---|---|
| Output type | 0..10V |
| Output current | max. 10mA per chanel<br>max. 70mA for all chanels |
| Resolution | 8 bits |
| Accuracy | 1% of FSR |
| Temperature drift | +-0.01%/°C of output range |
| Settling time | 50ms |
| Power supply | 24V (18..28V), 120mA (50mA+output current) |
| Galvanic Isolation | 1kV between digital and analog circuit<br>no isolation between chanels |
| Operating conditions | 0..50°C, 0..85% rh non-condensing |
| Mounting | DIN rail (35mm) |
| Dimensions | 53x117x58mm |
| Weight | 160g |
| Degree of protection | IP20 |
| Level of ambient pollution | 2 |
| Standards | EN 61010-1, EN 61010-2-201, EN 61131-2 |

# OP-2

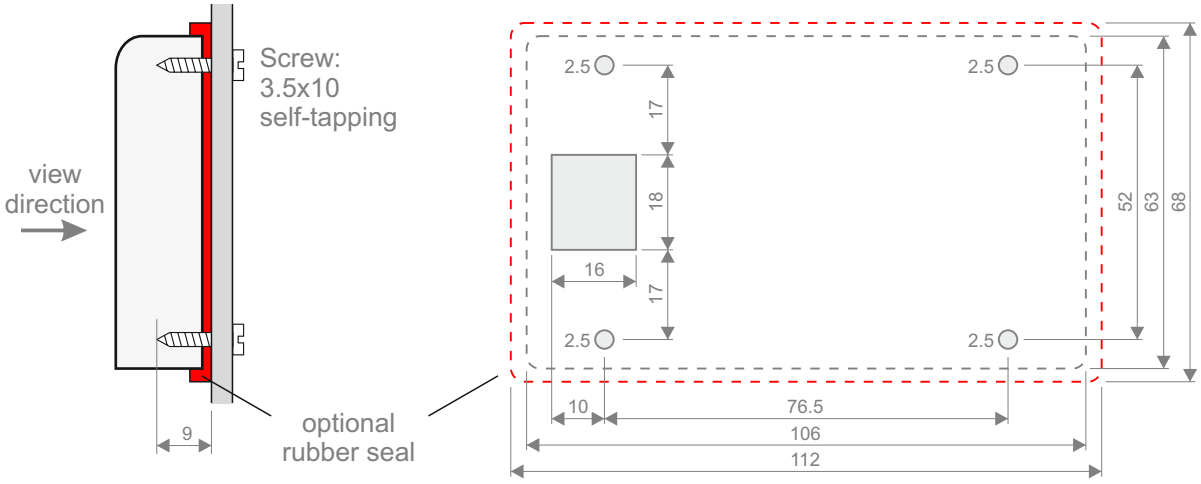
IEX-2 module, operator panel
LCD display 2x16 characters, black/green

industrial building


## I/O table

| | |
|---|---|
| key_f | Indicate status of operator panel F key (0-released, 1-pressed). |
| key_e | Indicate status of operator panel E (enter) key (0-released, 1-pressed). Always zero while mask is active. |
| key_dn | Indicate status of operator panel down key (0-released, 1-pressed). Always zero while mask is active. |
| key_up | Indicate status of operator panel up key (0-released, 1-pressed). Always zero while mask is active. |
| general_error | A one or more system errors occured (timeout, program or bus error). |
| timeout_error | Communication failed, no messages are coming from the module. |
| program_error | Internal or configuration error detected, module is not functional. |
| bus_error | Module detected a number of communication errors, but it is still working. |
| current_mask | Indicates current mask number (read only). Zero means no mask is active. |
| next_mask | Write a mask number to send a new mask to the operator panel. After mask is sent, will be automatically set to -1. |
| lcd_dimmer | Intensity of LCD backlight (0-maximum, 255-dark). |
| lcd_timeout | Time for LCD backlight to start dimming (0..120s). |

## Mounting




## Technical specifications

| | |
|---|---|
| IEX-2 connection | RJ9 |
| Display | LCD 2x16 characters |
| Backlight | green LED, adjustable 0..100% |
| Power supply | 24V (18..28V), 40mA |
| Operation conditions | 0..50°C, 0..85% rh non-condensing |
| Dimensions | 106x63x24mm |
| Weight | 120g |
| Degree of protection | IP54 (IP40 without rubber seal) |
| Level of ambient pollution | 2 |
| Standards | EN 61010-1, EN 61010-2-201, EN 61131-2 |

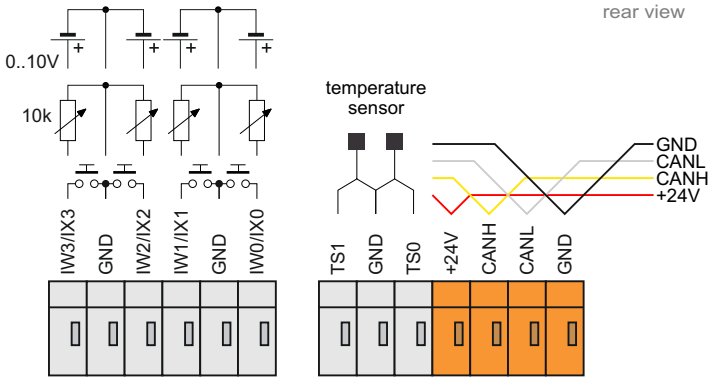
# OP-4

IEX-2 module, operator panel
LCD display 2x20 characters, white/blue
light sensor, IR receiver, beeper
2 temperature sensor inputs
4 switch/potentiometer inputs

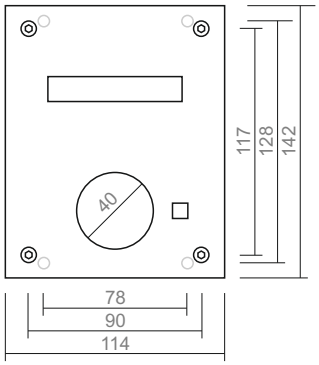
building

## Wiring diagram

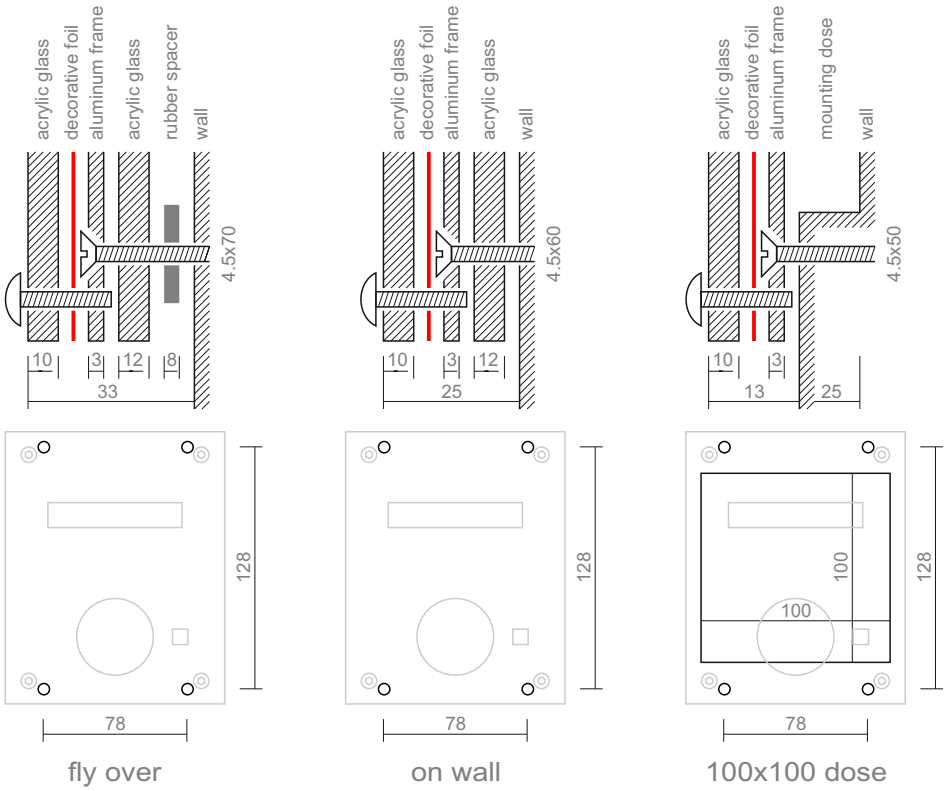
rear view




## Dimensions




## Mounting




## Technical specifications

| | |
|---|---|
| Display | LCD 2x20 characters |
| Backlight | white LED, adjustable 0..100% |
| IR receiver | RC5 36kHz, receiving distance 5m |
| Input type | dry contact, internal pull-up 12V 2mA<br>analog input 0..10V (10 bit, 0..1023) |
| External temperature sensor | ES-P, ES-B or ES-W |
| Light sensor | day/night mode switching |

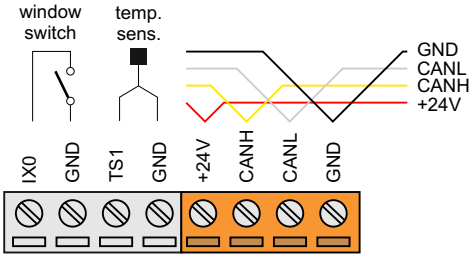
| | |
|---|---|
| Power supply | 24V (18..28V), 50mA |
| Degree of protection | IP20 |
| Operating conditions | 0..50°C, 0..85% rh non-condensing |
| Storage temperature | -20..75°C |
| Dimensions | 142x114x25mm |
| Weight | 600g |
| Level of ambient pollution | 2 |
| Standards | EN 60730-1 |

# OP-5

IEX-2 module, operator panel
LCD display 2x20 characters, white/blue
temperature, humidity and light sensor
IR receiver, beeper
1 temperature sensor input
1 switch/potentiometer input

building


## Wiring diagram



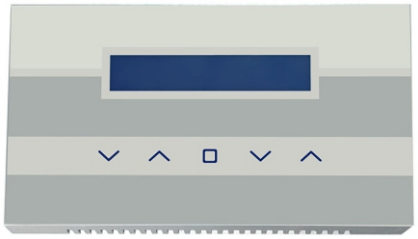

## Technical specifications

| | |
|---|---|
| Display | LCD 2x20 characters |
| Characters size | 3x5mm |
| Keys | 5 keys, audible press feedback, adjustable |
| Backlight | blue LED, adjustable 0..100% |
| IR receiver | RC5 36kHz, receiving distance 5m |
| Input type | dry contact, internal pull-up 12V 2mA<br>analog input 0..10V (10 bit, 0..1023) |
| Temperature measurement | range: 0°C to +50°C<br>error: ±0.5°C typ. (0°C to +50°C, backlight at 20%)<br>±2°C max. (0°C to +50°C)<br>resolution: 0.1°C (12 bit)<br>readout: 0.1°C (254 equals 25.4°C) |
| Humidity measurement | range: 0..100% rh, non-condensing<br>error: ±2% rh @ 25°C<br>response time 15s<br>stability ±1% rh @ 50% rh in 5 years<br>resolution 1% (7 bit)<br>readout 1% rh (45 equals 45% rh) |
| External temperature sensor | ES-P, ES-B or ES-W |
| Power supply | 24V (18..28V), 50mA |
| Degree of protection | IP20 |
| Operating conditions | 0..50°C, 0..85% rh non-condensing |
| Storage temperature | -20..75°C |
| Mounting | wall surface |
| Dimensions | 136x96x25mm |
| Weight | 420g |
| Level of ambient pollution | 2 |
| Standards | EN 60730-1 |

# OP-8

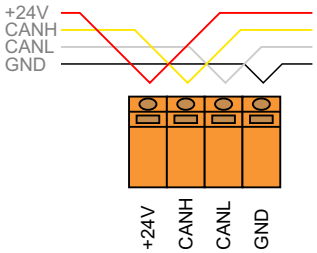
IEX-2 module, touch operator panel
LCD display 2x20 characters, white/blue
temperature, humidity and light sensor
IR receiver, beeper
1 switch/potentiometer input
1 temperature sensor input

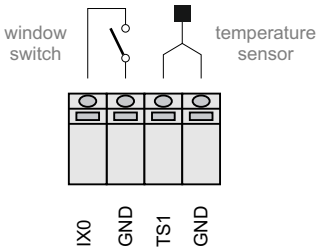
building

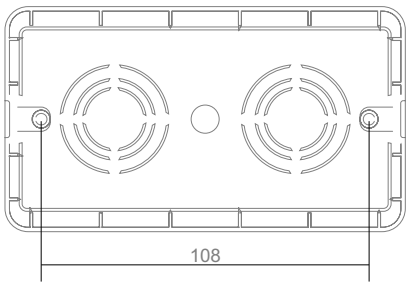


## Wiring diagram

rear view




## Technical specifications

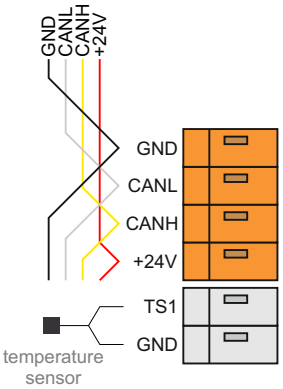
| | |
|---|---|
| Display | LCD 2x20 characters |
| Characters size | 3x5mm |
| Keys | 5 touch keys, tactile feedback |
| Backlight | blue LED, adjustable 0..100% |
| IR receiver | RC5 36kHz, receiving distance 5m |
| Input type | dry contact, internal pull-up 12V 2mA<br>analog input 0..10V (10 bit, 0..1023) |
| Temperature measurement | range: 0°C to +50°C<br>error: ±0.5°C typ. (0°C to +50°C, backlight at 20%)<br>±2°C max. (0°C to +50°C)<br>resolution: 0.1°C (12 bit)<br>readout: 0.1°C (254 equals 25.4°C) |
| Humidity measurement | range: 0..100% rh, non-condensing<br>error: ±2% rh @ 25°C<br>response time 15s<br>stability ±1% rh @ 50% rh in 5 years<br>resolution 1% (7 bit)<br>readout 1% rh (45 equals 45% rh) |
| External temperature sensor | ES-P, ES-B or ES-W |
| Power supply | 24V (18..28V), 50mA |
| Degree of protection | IP20 |
| Operating conditions | 0..50°C, 0..85% rh non-condensing |
| Storage temperature | -20..75°C |
| Mounting | M4 installation box |
| Dimensions | 144x80x7mm |
| Weight | 200g |
| Level of ambient pollution | 2 |
| Standards | EN 60730-1 |

# TS-H

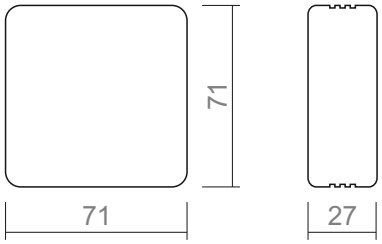
IEX-2 module
temperature and humidity sensor
1 temperature sensor input

building

## Wiring diagram




## Dimensions




## Mounting


## Technical specifications

| | |
|---|---|
| Temperature measurement | range: 0°C to +50°C<br>error: ±0.5°C typ. (0°C to +50°C)<br>±2°C max. (0°C to +50°C)<br>resolution: 0.1°C (12 bit)<br>readout: 0.1°C (254 equals 25.4°C) |
| Humidity measurement | range: 0..100% rh, non-condensing<br>error: ±2% rh @ 25°C<br>stability ±1% rh @ 50% rh in 5 years<br>resolution 1% (7 bit)<br>readout 1% rh (45 equals 45% rh) |
| External temperature sensor | ES-P, ES-B or ES-W |
| Power supply | 24V (18..28V), 15mA |
| Degree of protection | IP20 |
| Operating conditions | 0..50°C, 0..85% rh non-condensing |
| Storage temperature | -20..75°C |
| Mounting | wall surface |
| Dimensions | 71x71x27mm |
| Weight | 80g |
| Level of ambient pollution | 2 |
| Standards | EN 60730-1 |

## Order code

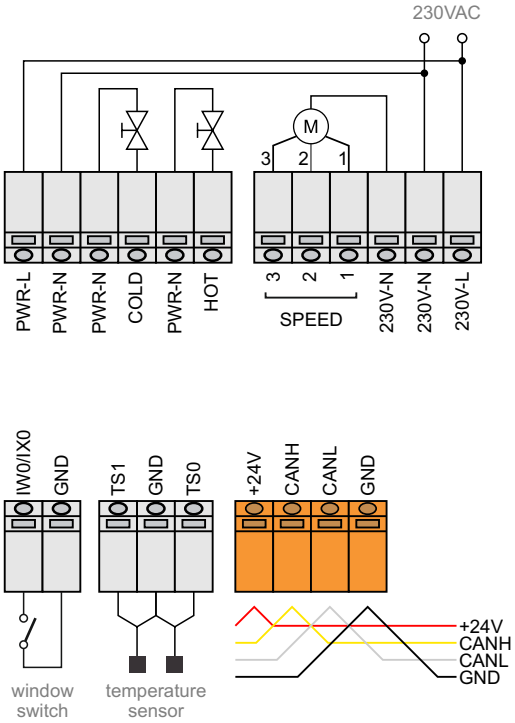
| | |
|---|---|
| TS | temperature sensor |
| TS-H | temperature sensor + humidity |

# FC

IEX-2 module, fan-coil controller
3 relay outputs 5A (fan speed)
2 relay outputs 5A (valve)
1 binary/analog input
2 temperature sensor inputs

building

## Wiring diagram



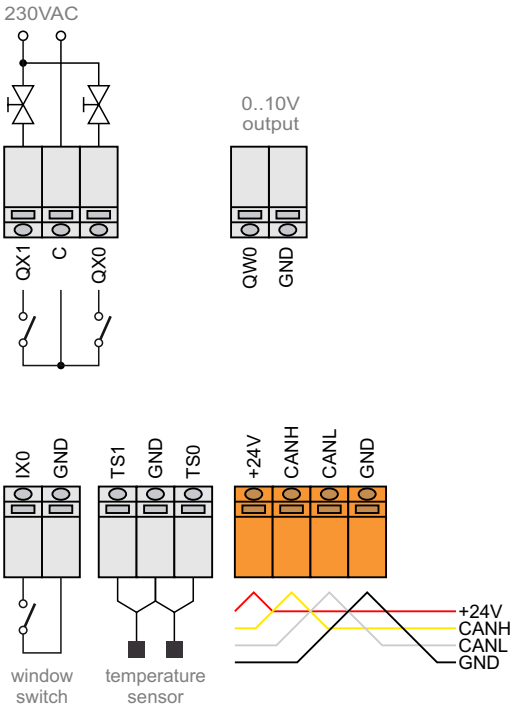

## Technical specifications

| | |
|---|---|
| Input type | dry contact, internal pull-up 12V 2mA<br>analog input 0..10V (10 bit, 0..1023) |
| Output type | relay 5A/250VAC resistive |
| External temperature sensor | ES-P, ES-B or ES-W |
| Power supply | 24V (18..28V), 100mA<br>(25mA+15mA*number of active outputs) |
| Galvanic isolation | 4kV between internal circuit and relay contacts |
| Degree of protection | IP20 |
| Operating conditions | 0..45°C, 0..95% rh non-condensing |
| Storage temperature | -20..75°C |
| Mounting | inside the fan coil unit |
| Dimensions | 108x86x46mm |
| Weight | 200g |
| Standards | EN 60730-1 |

# FC-2

IEX-2 module, fan-coil controller
1 analog output 0..10V (fan speed)
2 relay outputs 5A (valve)
1 binary/analog input
2 temperature sensor inputs


## Wiring diagram



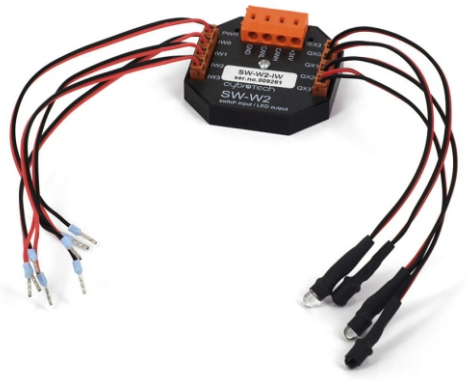

## Technical specifications

| | |
|---|---|
| Input type | dry contact, internal pull-up 12V 2mA<br>analog input 0..10V (10 bit, 0..1023) |
| Output type | 0..10V 10mA (7 bit, 0..100%)<br>relay 5A/250VAC resistive |
| External temperature sensor | ES-P, ES-B or ES-W |
| Power supply | 24V (18..28V), 100mA<br>(25mA+15mA*number of active outputs) |
| Galvanic isolation | 4kV between internal circuit and relay contacts |
| Degree of protection | IP20 |
| Operating conditions | 0..45°C, 0..95% rh non-condensing |
| Storage temperature | -20..75°C |
| Mounting | inside the fan coil unit |
| Dimensions | 108x86x46mm |
| Weight | 200g |
| Standards | EN 60730-1 |

# SW-W3

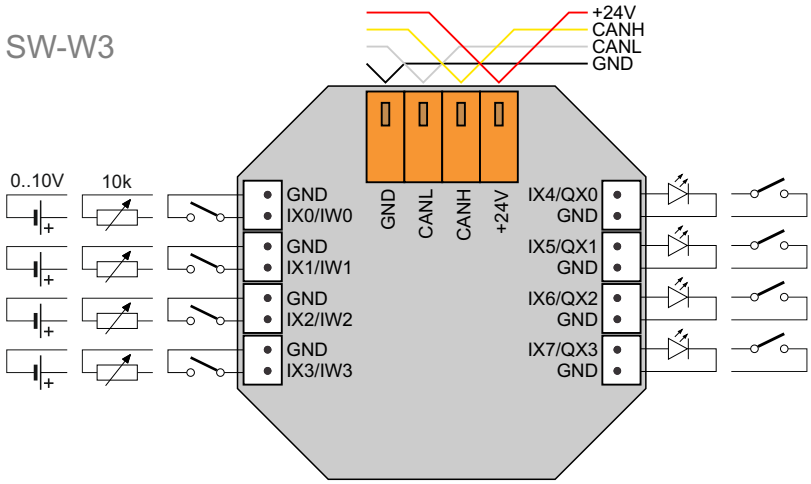
IEX-2 module
4 switch or potentiometer inputs
4 LED outputs or switch inputs
2 temperature sensor inputs (TIR only)
1 IR receiver input (TIR only)

building

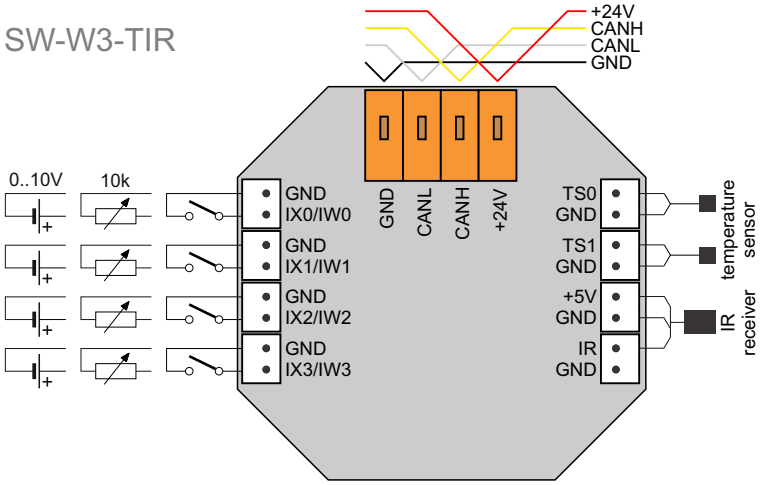


## Wiring diagram

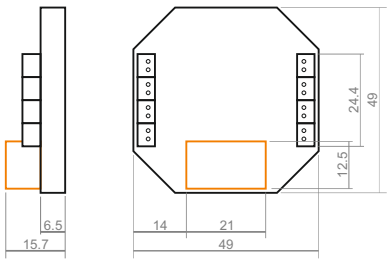
### SW-W3




### SW-W3-TIR




## Dimensions




## Technical specifications

| | |
|---|---|
| Input type | dry contact, internal pull-up 12V 2mA<br>0..10V (10 bit, 0..1023) or potentiometer |
| LED output | 5V 10mA |
| External temperature sensor | ES-P, ES-B or ES-W |
| External IR receiver | LRM1080 |
| Power supply | 24V (18..28V), 70mA<br>(30mA+10mA*number of active LEDs) |
| Galvanic isolation | none |
| Operating conditions | 0..45°C, 0..95% rh non-condensing |
| Storage temperature | -20..75°C |
| Mounting | in-wall, flush box fi60 |
| Dimensions | 50x50x15mm |
| Weight | 40g |
| Standards | EN 60730-1 |

## Order code

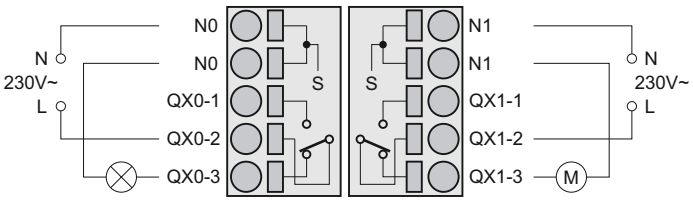
| | |
|---|---|
| SW-W3 | basic version |
| SW-W3-TIR | temperature and IR sensor inputs |

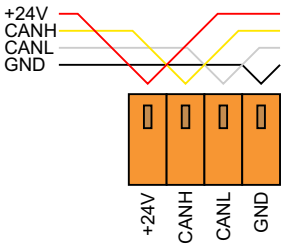
# O2

IEX-2 module
2 relay outputs 16A
2 mains sense inputs

building

## Wiring diagram




Mains sense is connected
to the relay middle contact

## Order code

| | |
|---|---|
| O2-L | power relay for lights and blinds<br>normally open and normally closed contacts |

## Technical specifications

| | |
|---|---|
| Output type | relay 16A/250VAC resistive |
| Power supply | 24V (18..28V), 60mA |
| Galvanic isolation | 5kV between internal circuit and relay contacts |
| Operating conditions | 0..45°C, 0..95% rh non-condensing |
| Storage temperature | -20..75°C |
| Mounting | in-wall, flush box fi80 |
| Dimensions | 55x60x20mm |
| Weight | 80g |
| Standards | EN 60730-1 |

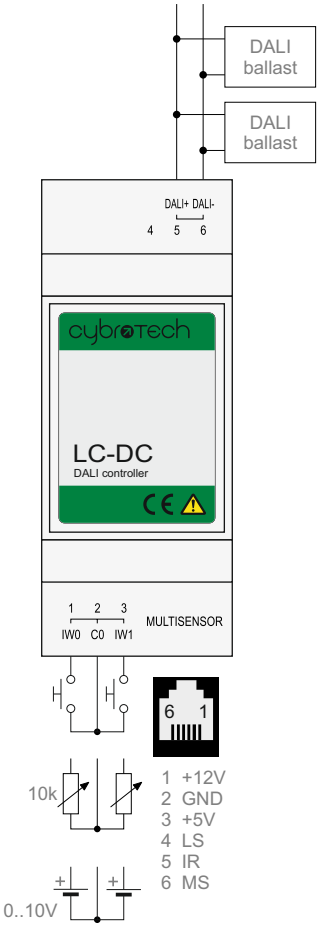
# LC-DC

IEX-2 module, DALI light controller
DALI/DALI-2 send and receive
16 and 24 bit commands
DALI power supply
2 analog/digital inputs
light, motion and IR sensor input

building

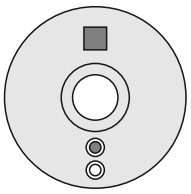
EXAMPLE
CyPro/Examples/
DaliDemo.cyp


## Wiring diagram




## Multisensor

| Pin | LC-DC | multisensor |
|---|---|---|
| 1 | +12V output | +12V power supply |
| 2 | GND | GND |
| 3 | +5V output | +5V power supply |
| 4 | LS input 0..10V | light sensor |
| 5 | IR input | IR receiver |
| 6 | MS input | motion sensor |



LRI8134

## Technical specifications

| | |
|---|---|
| Input type | dry contact, internal pull-up 12V 2mA<br>analog input 0..10V (10 bit, 0..1023)<br>potentiometer 0..10k (10 bit, 0..1023) |
| Sensor input | LRI8134 (multisensor) |
| DALI output current | 200mA |
| Load protection | short circuit protected |
| Number of ballasts | 64 |
| Power supply | 24V (18..28V), 120mA |
| Galvanic isolation | none (DALI ballasts must be SELV) |
| Operating conditions | 0..45°C, 0..95% rh non-condensing |
| Storage temperature | -20..75°C |
| Degree of protection | IP20 |
| Dimensions | 36x117x58mm |
| Weight | 120g |
| Standards | EN 60730-1 |

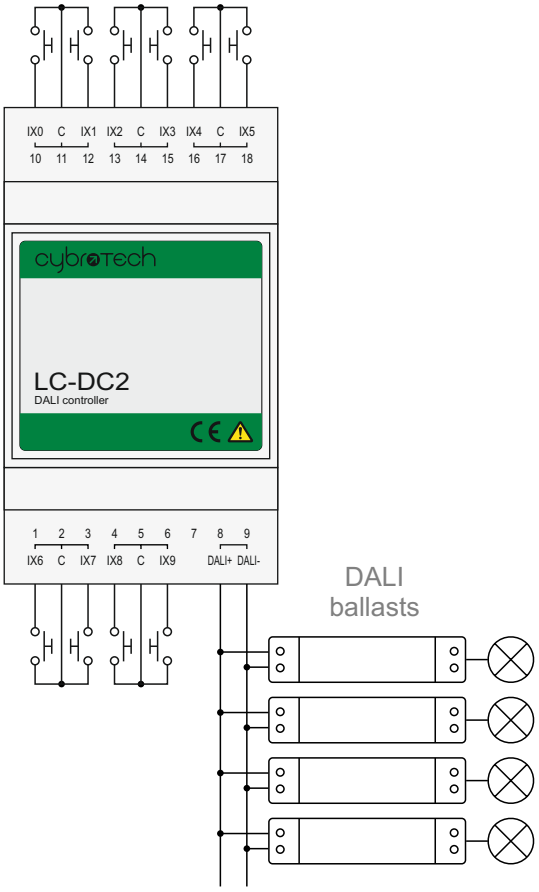
# LC-DC2

IEX-2 module, DALI light controller
DALI/DALI-2 send and receive
16 and 24 bit commands
DALI power supply
10 digital inputs

building

EXAMPLE
CyPro/Examples/
DaliDemo.cyp


## Wiring diagram




## Technical specifications

| | |
|---|---|
| Input type | dry contact, internal pull-up 12V 2mA |
| Galvanic isolation | none |
| DALI output current | 100mA |
| Ballasts per device | 60 (1mA) or 30 (2mA) |
| Bus length | 200m |
| Galvanic isolation | 3kV or none |
| 230V tolerance | no |
| Power supply | 24V (18..28V), 200mA |
| Operating conditions | 0..45°C, 0..95% rh non-condensing |
| Storage temperature | -20..75°C |
| Degree of protection | IP20 |
| Dimensions | 53x117x58mm |
| Weight | 150g |
| Standards | EN 60730-1 |

## Order code

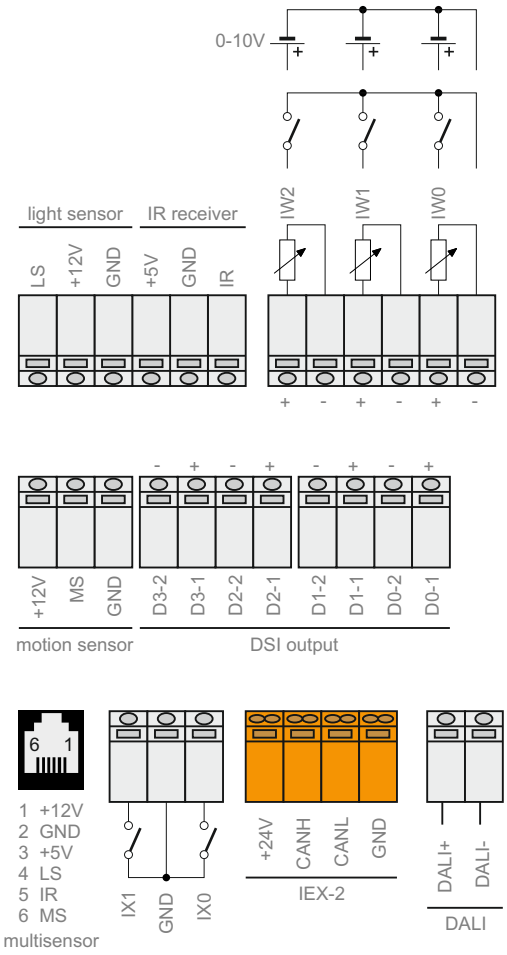
| | |
|---|---|
| LC-DC2 | no galvanic isolation |
| LC-DC2-ISO | full galvanic isolation (SELV) |

# LC-D

IEX-2 module, DALI light controller
DALI output, 4 DSI outputs
3 analog/digital inputs
2 digital inputs
light, motion and IR sensor input

building

## Wiring diagram

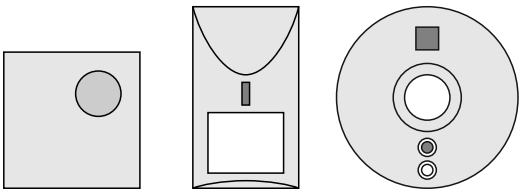






## Multisensor

| Pin | LC-D | multisensor |
|---|---|---|
| 1 | +12V output | +12V power supply |
| 2 | GND | GND |
| 3 | +5V output | +5V power supply |
| 4 | LS input 0..10V | light sensor |
| 5 | IR input | IR receiver |
| 6 | MS input | motion sensor |



RHKF-U | IR-580-IQ | LRI8134

## Technical specifications

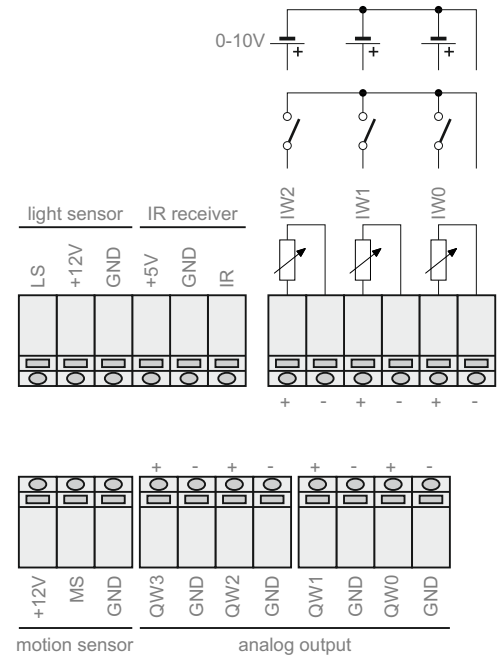
| | |
|---|---|
| Input type | dry contact, internal pull-up 12V 2mA<br>analog input 0..10V (10 bit, 0..1023)<br>potentiometer 0..10k (10 bit, 0..1023) |
| Sensor input | RHKF-U (light), IR-580-IQ (motion),<br>LRI8134 (multisensor) |
| DALI output current | 100mA |
| Load protection | short circuit protected |
| Number of ballasts | 32 |
| DSI output current | 250mA per channel |
| Load protection | short circuit protected |
| Number of ballasts | 100 |
| Light sensor | |
| Power supply output | 12V 25mA |
| Input range | 0..10V (10 bit, 0..1023) |
| Internal pull-up | none |
| Motion detector | |
| Power supply output | 12V 25mA |
| Signal type | dry contact |
| Internal pull-up | 12V 1mA |
| Infrared receiver | |
| Power supply output | 5V 10mA |
| Signal type | TTL level, active low |
| Internal pull-up | 5V 0.5mA |
| Power supply | 24V (18..28V), 150mA |
| Galvanic isolation | none (DALI ballasts must be SELV) |
| Operating conditions | 0..45°C, 0..95% rh non-condensing |
| Dimensions | 108x86x46mm |
| Weight | 200g |
| Degree of protection | IP42 |
| Standards | EN 60730-1 |

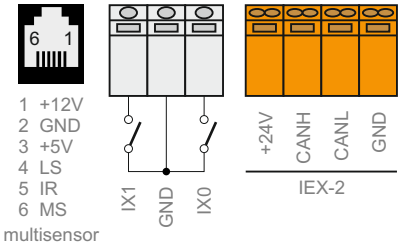
# LC-S

IEX-2 module, analog light controller
4 analog outputs 0..10V
3 analog/digital inputs
2 digital inputs
light, motion and IR sensor input

building

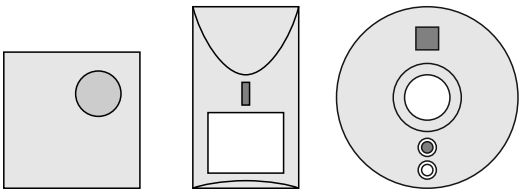
## Wiring diagram




## Multisensor

| Pin | LC-S | multisensor |
|---|---|---|
| 1 | +12V output | +12V power supply |
| 2 | GND | GND |
| 3 | +5V output | +5V power supply |
| 4 | LS input 0..10V | light sensor |
| 5 | IR input | IR receiver |
| 6 | MS input | motion sensor |



RHKF-U | IR-580-IQ | LRI8134

## Technical specifications

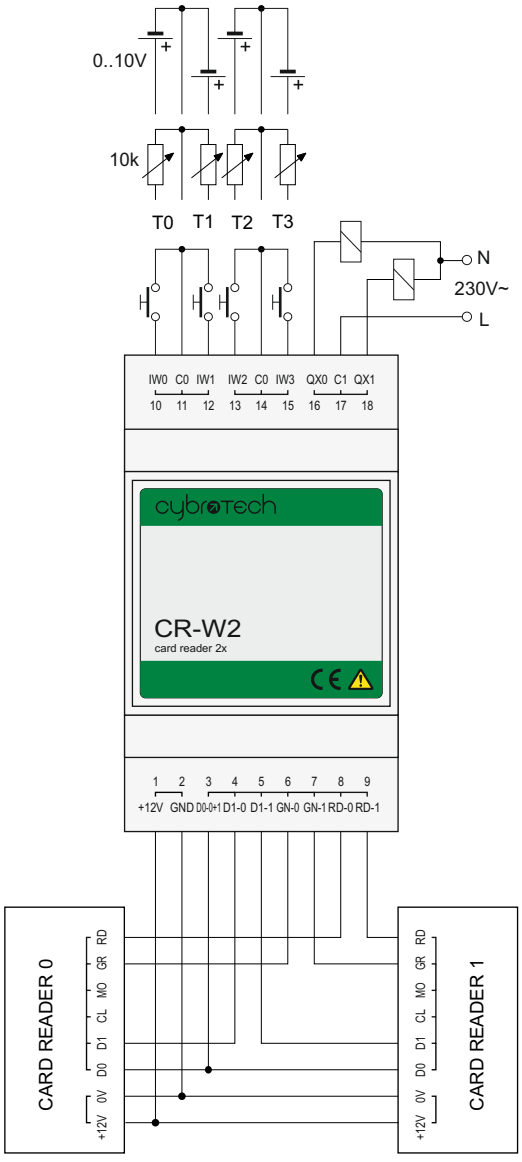
| | |
|---|---|
| Input type | dry contact, internal pull-up 12V 2mA<br>analog input 0..10V (10 bit, 0..1023)<br>potentiometer 0..10k (10 bit, 0..1023) |
| Sensor input | RHKF-U (light), IR-580-IQ (motion),<br>LRI8134 (multisensor) |
| Analog output | 0..10V (8 bit, 0..255) |
| Output current | 10mA per channel, sink or source |
| Number of ballasts | 50 per channel, 100 total |
| Light sensor | |
| Power supply output | 12V 25mA |
| Input range | 0..10V (10 bit, 0..1023) |
| Internal pull-up | none |
| Motion detector | |
| Power supply output | 12V 25mA |
| Signal type | dry contact |
| Internal pull-up | 12V 1mA |
| Infrared receiver | |
| Power supply output | 5V 10mA |
| Signal type | TTL level, active low |
| Internal pull-up | 5V 0.5mA |
| Power supply | 24V (18..28V), 150mA |
| Galvanic isolation | none (ballasts must be SELV) |
| Operating conditions | 0..45°C, 0..95% rh non-condensing |
| Dimensions | 108x86x46mm |
| Weight | 200g |
| Degree of protection | IP42 |
| Standards | EN 60730-1 |

# CR-W2

IEX-2 module
2 Wiegand interface
4 analog/digital inputs
2 relay outputs 5A

building


## Wiring diagram




## Technical specifications

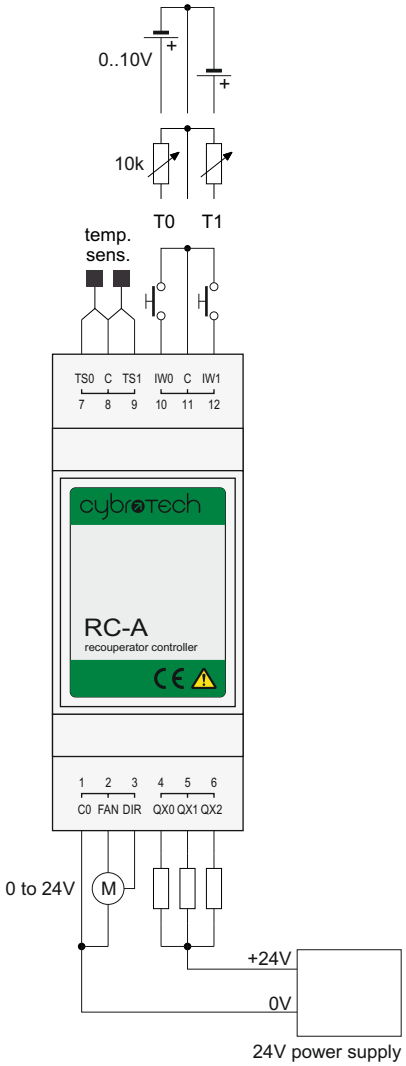
| | |
|---|---|
| Input type | dry contact, internal pull-up 12V 2mA<br>analog input 0..10V or potentiometer 10k |
| Output type | relay 5A/250VAC resistive |
| Reader protocol | Wiegand |
| Data input | active low, internal pull-up 5V 1mA |
| Data timing | 20us min. pulse on D0/D1, 20ms timeout |
| Data format | 26/34/44 bits processed, 1..64 bits raw |
| Power supply output | 12V 500mA |
| LED output | 500mA NPN open collector, GN/RD |
| LED connection | output to +12V or +24V |
| Power supply | 24V (18..28V), 40..350mA (idle to full load) |
| Galvanic isolation | none |
| Operating conditions | 0..45°C, 0..95% rh non-condensing |
| Storage temperature | -20..75°C |
| Degree of protection | IP20 |
| Dimensions | 53x117x58mm |
| Weight | 160g |
| Standards | EN 60730-1 |

# RC-A

IEX-2 module, recuperator controller
1 fan speed output 0..24V 2A
1 fan direction PNP output 2A
3 NPN open-collector outputs 2A
2 temperature sensor inputs
2 digital/analog inputs

building

## Wiring diagram




## Technical specifications

| | |
|---|---|
| Input type | dry contact, internal pull-up 12V 2mA<br>analog input 0..10V or potentiometer 10k |
| Output type | NPN transistor 2A 30V |
| Analog output for fan | 0..24VDC, max. 2A |
| Temperature measurement | ES digital sensor |
| Power supply | 24V (18..28V), 90mA |
| Galvanic isolation | none |
| Operating conditions | 0..45°C, 0..95% rh non-condensing |
| Storage temperature | -20..75°C |
| Degree of protection | IP20 |
| Dimensions | 36x117x58mm |
| Weight | 100g |
| Standards | EN 60730-1 |

# GW-MP

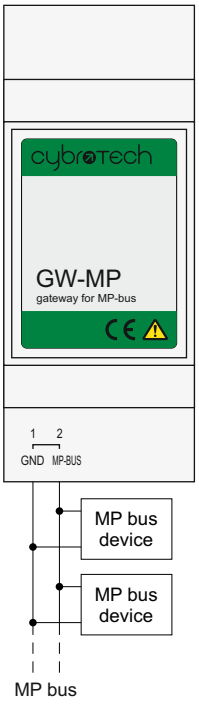
IEX-2 module
Belimo MP-bus gateway
for valves and actuators

building

EXAMPLE

CyPro/Examples/
MpBusDemo.cyp


## Wiring diagram



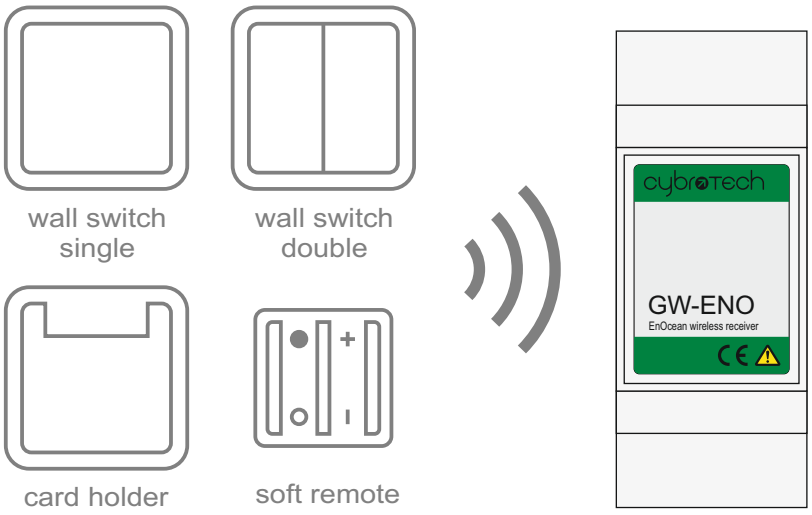

## Technical specifications

| | |
|---|---|
| Power supply | 24V (18..28V), 30mA |
| Galvanic isolation | 1kV between internal circuit and communication |
| Operating conditions | 0..50°C, 0..85% rh non-condensing |
| Mounting | DIN rail (35mm) |
| Degree of protection | IP20 |
| Dimensions | 36x117x58mm |
| Weight | 100g |
| Level of ambient pollution | 2 |
| Standards | EN 60730-1 |

# GW-ENO

IEX-2 EnOcean receiver for switches

building


| SUPPORTED MODULES | MODEL | PROFILE | eno_command |
|---|---|---|---|
| Wall switch, single or double | CWS-2-1-01 | F6-02-01 | unique button code |
| Soft remote | CRC-2-6-0x | F6-02-02 | unique button code |
| Card holder | CCS-2-1-01 | F6-04-01 | unique button code |

## Technical specifications

| | |
|---|---|
| Interface | EnOcean wireless protocol |
| Frequency | 868 MHz |
| Coverage | 10m indoor, 100m outdoor |
| Number of modules | unlimited (no learning) |
| Power supply | 24V (18..28V), 40mA |
| Operating conditions | 0..50°C, 0..85% rh non-condensing |
| Mounting | DIN rail (35mm) |
| Degree of protection | IP20 |
| Dimensions | 36x117x58mm |
| Weight | 100g |
| Level of ambient pollution | 2 |
| Standards | EN 60730-1 |

# EnOcean

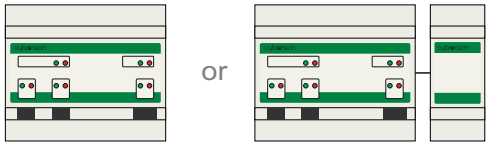
EnOcean Gateway, bidirectional

building

EXAMPLE

CyPro/Examples/
EnOceanGateway

## Hardware options



Cybro-3-ENO or Cybro-3 GW-ENO2

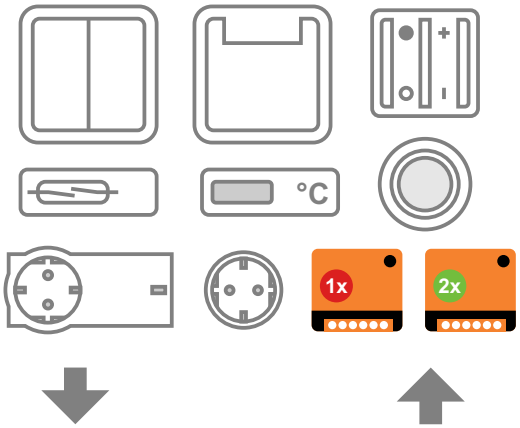
Both options have the same functionality and specifications. Not compatible with Cybro-2.

## Software

EnOceanGateway.cyp

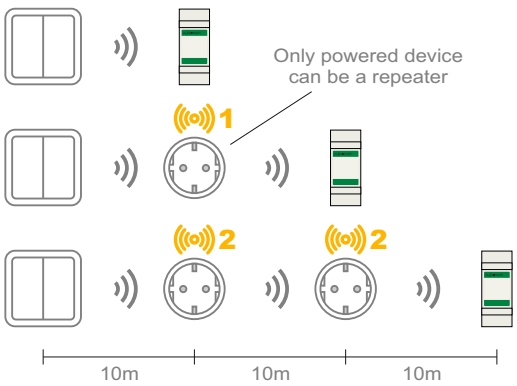
Mini scada

Gateway is written as plc program, just copy code and variables to your application.




| SUPPORTED MODULES | MODEL | PROFILE | eno_iw00[n] | eno_iw01[n] | eno_iw02[n] | eno_qw00[n] | eno_qw01[n] |
|---|---|---|---|---|---|---|---|
| Wall switch, single or double | CWS-2-1-01 | F6-02-01 | input 0/1/2/4/8 | - | - | - | - |
| Soft remote | CRC-2-6-0x | F6-02-02 | input 0/1/2/4/8 | - | - | - | - |
| Soft button | TSB-2-2-01 | D2-03-0A | action 1/2/3/4 | - | battery [%] | - | - |
| Card holder | CCS-2-1-01 | F6-04-01 | input 0/1 | - | - | - | - |
| Door sensor | SDO-2-1-05 | D5-00-01 | input 0/1 | - | - | - | - |
| Motion sensor | PIR-2-1-01 | A5-07-03 | input 0/1 | lightness [lux] | battery [0.1V] | - | - |
| Temperature sensor | STP-2-1-05 | A5-02-05 | temp [0.1°C] | - | - | - | - |
| Temperature and humidity | STPH-2-1-05 | A5-04-01 | temp [0.1°C] | humidity [%] | - | - | - |
| Smart plug | ASP-2-1-10 | D2-01-0A | - | - | - | output 0/1 | - |
| Smart plug with metering | ASP-2-1-11 | D2-01-0B | power [W] | energy [Wh] | - | output 0/1 | - |
| Micro smart plug with metering | MSP-2-1-11 | D2-01-0E | power [W] | energy [Wh] | - | output 0/1 | - |
| Relay switch one channel | SIN-2-1-01 | D2-01-0F | - | - | - | output 0/1 | - |
| Relay switch two channels | SIN-2-2-01 | D2-01-12 | - | - | - | output 0/1 | output 0/1 |
| Radiator valve | MVA004 | A5-20-01 | temp [0.1°C] | position [%] | status bits DB2 | setpoint %/°C | oper. mode DB1 |

## Repeater level




## EnOcean specifications

| | |
|---|---|
| Interface | EnOcean wireless protocol |
| Frequency | 868 MHz |
| Coverage | 10m indoor, 100m outdoor |
| Number of modules | 20 |

## Technical specifications GW-ENO2

| | |
|---|---|
| Power supply | 24V (18..28V), 40mA |
| Operating conditions | 0..50°C, 0..85% rh non-condensing |
| Mounting | DIN rail (35mm) |
| Degree of protection | IP20 |
| Dimensions | 36x117x58mm |
| Weight | 100g |
| Level of ambient pollution | 2 |
| Standards | EN 60730-1 |

# ZigBee

IEX-2 gateway for ZigBee plug

building

EXAMPLE

CyPro/Examples/
ZigbeeGateway

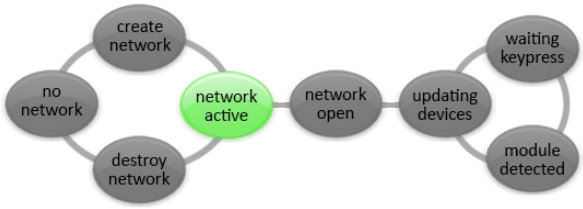
## Connection diagram


| SUPPORTED MODULES | COMPANY | MODEL | PROFILE |
|---|---|---|---|
| Remote control plug | 4-NOKS | ZR-PLUG-XX-M | ZigBee PRO |
| Wall-on steady device | 4-NOKS | ZR-SWITCH-M | ZigBee PRO |

## Add new devices

- press "Add devices" button
- wait until network state comes to "waiting keypress"
- connect new RF actuator and briefly press device button
- when device LED start blinking red, press device button again
- new module will be ready in about 30 seconds
- repeat the procedure for each module
- press "Finish adding" button

If device is not recognized, or "addressing error" displays, first remove device from the network, then repeat the procedure. If not finished, network will automatically close in 5 minutes.




## Remove device from network

- press and hold device button
- in about 6 seconds LED will turn green
- in about 12 seconds LED will turn red
- when LED turns red, release button
- in a few seconds LED will turn yellow, with periodic blinking
- in about 60 seconds device will disappear from the network

If procedure fails, unplug device, plug it again, and then repeat.

## Destroy and rebuild network

- remove devices one by one
- press "Rebuild" button
- add devices one by one

## Order code

| | |
|---|---|
| COM-NOK | master controller for network control |
| ZC-GW-485-EM | protocol converter Modbus to ZigBee |
| ZR-PLUG-XX-M | electricity meter and remote control plug |
| ZR-SWITCH-M | electricity meter and remote control relay |

## ZigBee specifications

| | |
|---|---|
| Interface | ZigBee Pro 3.5 (IEEE 802.15.4) |
| Frequency | 2.4GHz |
| Coverage | 30m indoor, 100m outdoor |
| Number of modules | 8 |

## Technical specifications COM-NOK

| | |
|---|---|
| Power supply | 24V (18..28V), 40mA |
| Operating conditions | 0..50°C, 0..85% rh non-condensing |
| Mounting | DIN rail (35mm) |
| Degree of protection | IP20 |
| Dimensions | 36x117x58mm |
| Weight | 120g |
| Level of ambient pollution | 2 |
| Standards | EN 60730-1 |

# GSM-1

IEX-2 module, CALL/SMS/GPRS
4 analog/digital input
2 relay output 1A

industrial building

EXAMPLE
CyPro/Examples/
GsmPlcDemo.cyp

activate output with a call

activate output with a message

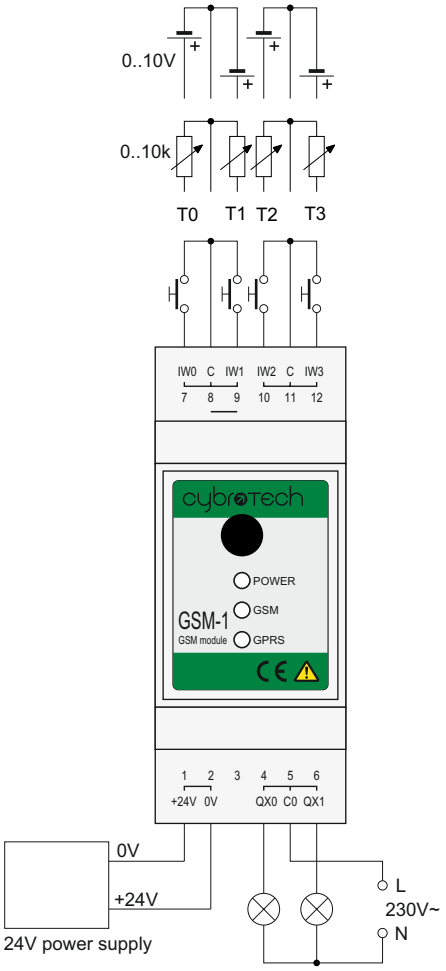
make a call when condition is met

send message when condition is met

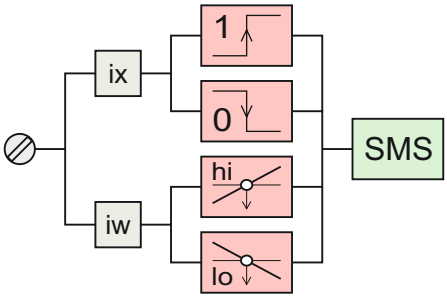
read measurements with a message

authorize other users with a message

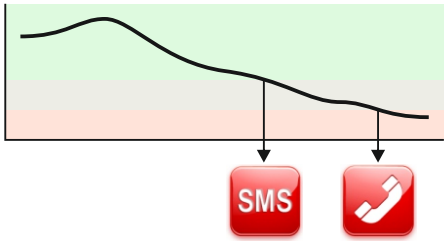
## Wiring diagram




## Trigger events




## Example




## Technical specifications

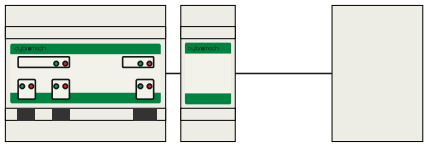
| | |
|---|---|
| Input type | dry contact, internal pull-up 12V 2mA<br>analog input 0..10V (10 bit, 0..1023) |
| Output type | relay 1A/250VAC resistive, normally open |
| Quad band | GSM/GPRS 850/900/1800/1900 MHz |
| Performance | class 4 (2W) 850/900MHz, class 1 (1W) 800/1900MHz |
| Antenna | internal or external (SMA 50 ohm) |
| Power supply | 24V (18..28V), 70mA (standby), 100mA (active) |
| Operating conditions | 0..50°C, 0..85% rh non-condensing |
| Mounting | DIN rail (35mm) |
| Degree of protection | IP20 |
| Dimensions | 36x117x58mm |
| Weight | 160g |
| Level of ambient pollution | 2 |
| Standards | EN 301489-1, EN 301489-7, EN 301511,<br>EN 61010-1, EN 61010-2-201, EN 61131-2 |

# COM module

IEX-2 protocol converter
RS-232 / RS-485 / CAN
galvanically isolated

industrial

building

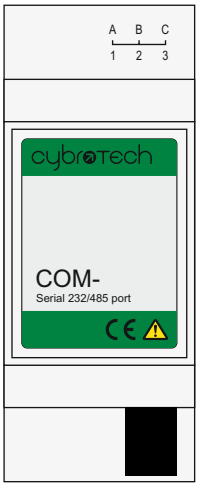


Cybro COM any serial device

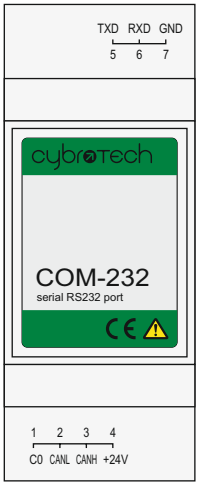
**EXAMPLE**

CyPro/Examples/
SerialPortDemo.cyp
CyPro/Examples/
ModbusRtuMaster3.cyp

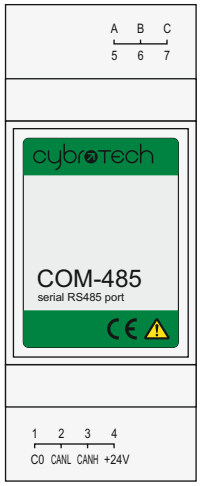
COM-



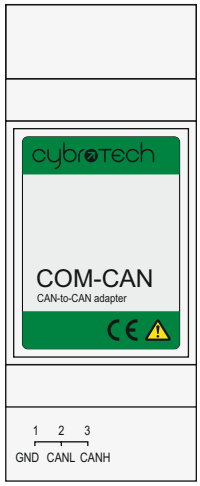

COM-232




COM-485




COM-CAN




| | | | | |
|---|---|---|---|---|
| IEX-2 | RJ9 left+right | terminals | terminals | RJ9 left+right |
| RS-232 | RJ9 | terminals | - | - |
| RS-485 | terminals | - | terminals | - |
| CAN port | - | - | - | terminals |

## Order code (serial)

| | |
|---|---|
| COM- | IEX-2 to RS-232/485 |
| COM-232- | IEX-2 to RS-232 |
| COM-485- | IEX-2 to RS-485 |
| -PGM | Free-programmable port |
| -MB | Modbus RTU master |
| -DMX | DMX controller for lights |
| -WXT | Vaisala WXT520 weather station |
| -PMI | Iskra/Eastron power meter |
| -EM6 | Schneider EM6400 power meter |
| -SAT | Satcon PV inverter |
| -SAN | Sanrex PV central inverter |
| -KAC | KACO Powador PV inverter |
| -BON | Bonfiglioli PV inverter |
| -STU | Studer PV inverter and BMS |

## Order code (CAN)

| | |
|---|---|
| COM-CAN- | IEX-2 to CAN |
| -BAT | Alpha battery management |
| -BCM | A123 battery management |
| -LIS | Lishen battery management |

## Example

| | |
|---|---|
| COM-485-WXT | Vaisala WXT520 weather station connected using RS485 |

COM module allows connecting any serial device to IEX-2 network. Protocol translation is handled by firmware, so Cybro controller see device as native IEX-2 module. For example, power meter may be visible as pm00_real_power [W], pm00_reactive_power [VA] and pm00_total_energy [kWh]. Communication goes both ways.

COM module is available in three versions, with a different set of connectors and terminals. Each firmware is compatible with all hardware versions.

Fourth version, COM-CAN, allow connecting any CAN device to IEX-2 network. No matter the protocol, Cybro can see it as a native IEX-2 module.

For a serial device not listed here, ask quote.

## Technical specifications

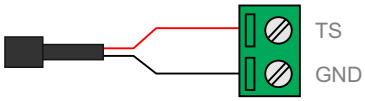
| | |
|---|---|
| Power supply | 24V (18..28V), 40mA |
| Galvanic isolation | 1kV between internal circuit and com port |
| Operating conditions | 0..50°C, 0..85% rh non-condensing |
| Mounting | DIN rail (35mm) |
| Degree of protection | IP20 |
| Dimensions | 36x117x58mm |
| Weight | 120g |
| Level of ambient pollution | 2 |
| Standards | EN 61010-1, EN 61010-2-201, EN 61131-2 |

# ES

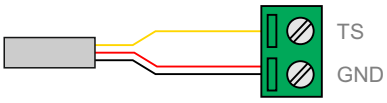
Temperature sensor

building

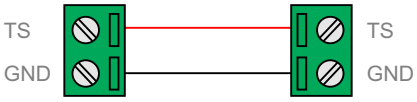
## ES-P



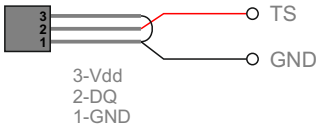

## ES-B




## ES-W




## DS18B20 wiring diagram




3-Vdd
2-DQ
1-GND

## Order code

| | |
|---|---|
| ES-P | heatshrink |
| ES-B | steel tube |
| ES-W | plastic box |

## Technical specifications

| | |
|---|---|
| ES-P | |
| Housing | heatshrink tube |
| Operating range | -50 to +100°C |
| Degree of protection | IP50 |
| Cable length | 2m |
| ES-B | |
| Housing | steel tube |
| Operating range | -50 to +100°C |
| Degree of protection | IP67 |
| Cable length | 5m |
| ES-W | |
| Housing | plastic box, white |
| Operating range | 0 to +50°C |
| Degree of protection | IP20 |
| Mounting | wall surface |
| Dimensions | 71x71x27mm |
| Sensor type | DS18B20 digital thermometer |
| Accuracy | ±0.2°C typ. (-10 to +85°C)<br>±0.5°C max. (-10 to +85°C)<br>±2.0°C max. (-50 to +100°C) |
| Cable length | 20m max. |
| Recommended cable | UTP 0.25..0.5mm2 |

# Accessories

industrial building


## CAD-232-A2

RS-232 to RS-485 converter, RJ9 to terminals

| | |
|---|---|
| Galvanic isolation | power supply/232 to 485 |
| Power supply | 24V 50mA from IEX-2 bus |
| Order code | CAD-232-A2 |

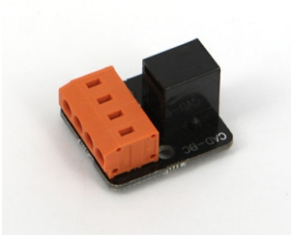

## BE-PROT

IEX-2 surge protector, RJ9 to terminals

| | |
|---|---|
| Surge protection | 1.5kW at 10/1000us |
| Error output | 24V 10mA opto isolated |
| Order code | CAD-BE-PROT |

## RE-2 remote

| | |
|---|---|
| Operating range | 5m |
| Protocol | RC-5 |
| Battery | 1x CR2025 |
| Dimensions | 40x85x5mm |
| Weight | 20g |
| Order code | RE-2 |



## CAD-BC

IEX-2 bus expander, RJ9 to terminals

| | |
|---|---|
| Order code | CAD-BC |

## CAD-SPL

IEX-2 bus splitter, 1xRJ9 into 2xRJ9

| | |
|---|---|
| Order code | CAD-SPL |

## CAD-Px

IEX-2 cable, RJ9 to RJ9

| | |
|---|---|
| CAD-P0 | 3cm |
| CAD-P1 | 1m |
| CAD-P2 | 2m |
| CAD-P3 | 3m |

| | |
|---|---|
| 1 +24V | 4 +24V |
| 2 CANH | 3 CANH |
| 3 CANL | 2 CANL |
| 4 GND | 1 GND |

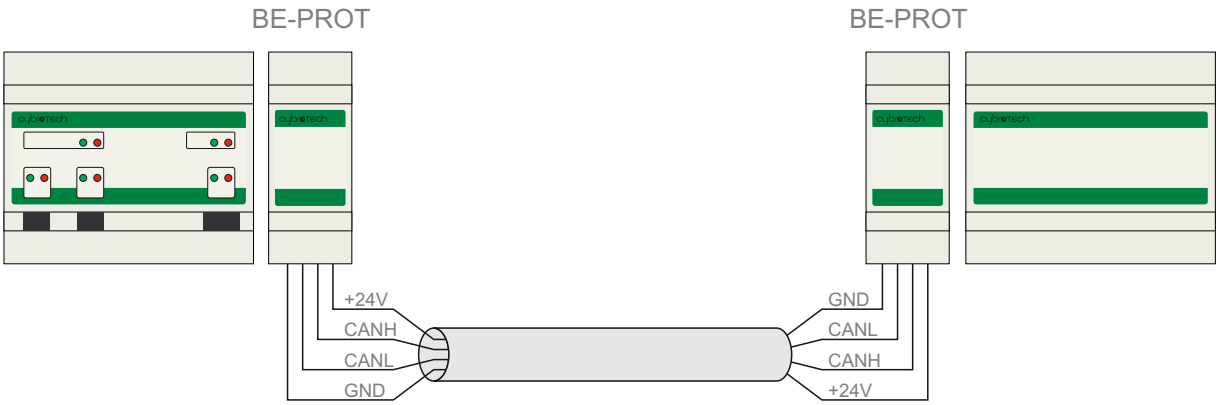
## CAD-232-Px

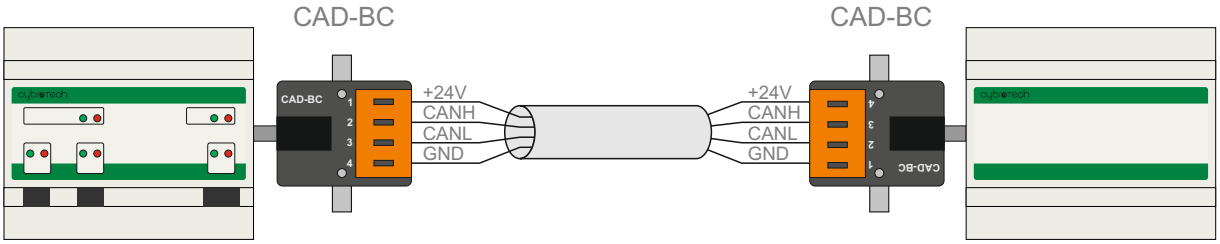
RS-232 cable, RJ9 to RJ9, Cybro to CAD-232-A2

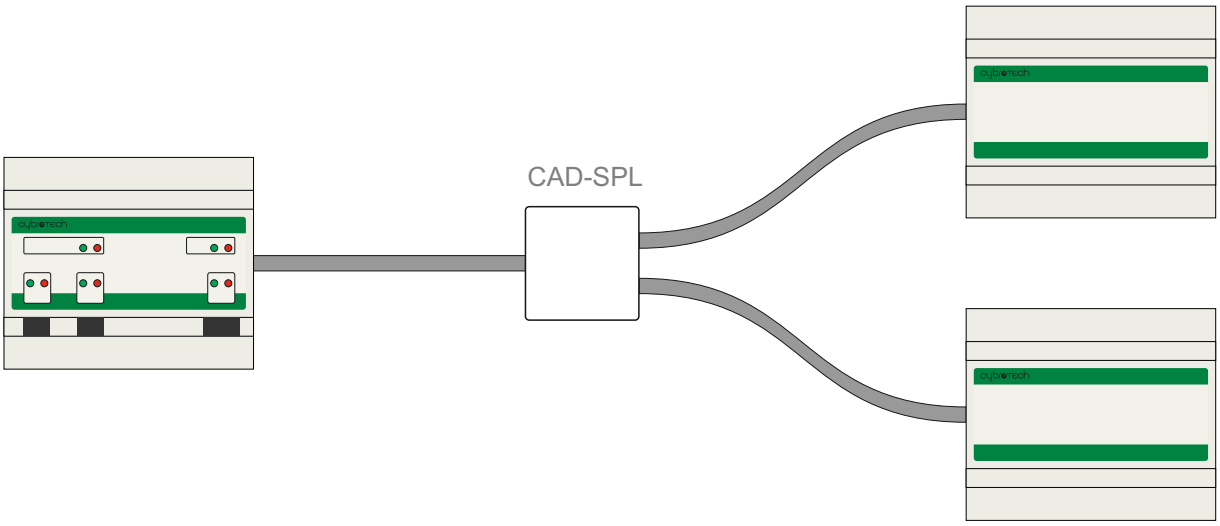
| | |
|---|---|
| CAD-232-P0 | 20cm |
| CAD-232-P2 | 2m |

| | |
|---|---|
| 1 GND | 1 GND |
| 2 | 2 |
| 3 RxD | 3 TxD |
| 4 TxD | 4 RxD |

# Accessories



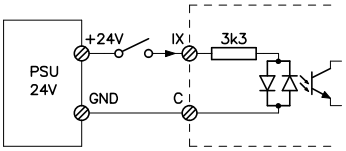



# I/O schematics

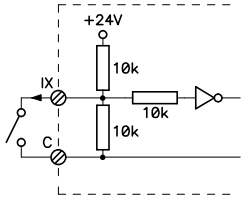
internal input/output wiring diagrams

## Digital input

### opto isolated

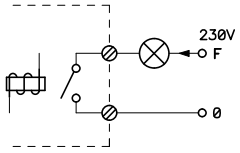



### dry contact

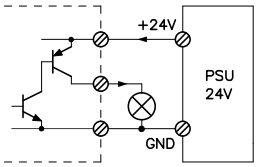



## Digital output

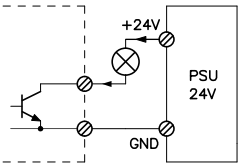
### relay




### PNP transistor

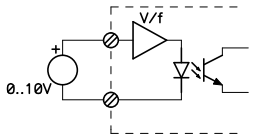



### NPN transistor

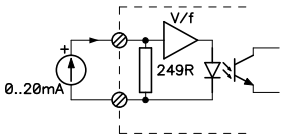



## Analog input

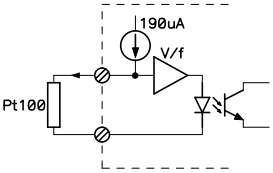
### voltage



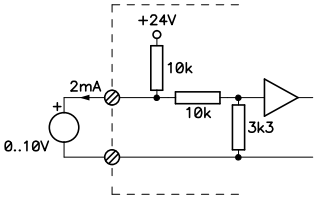

### current




### resistance

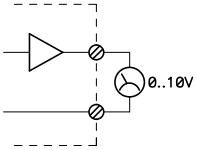



### analog/digital

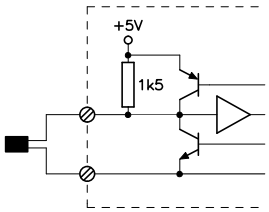



## Analog output

### voltage




## Temperature sensor



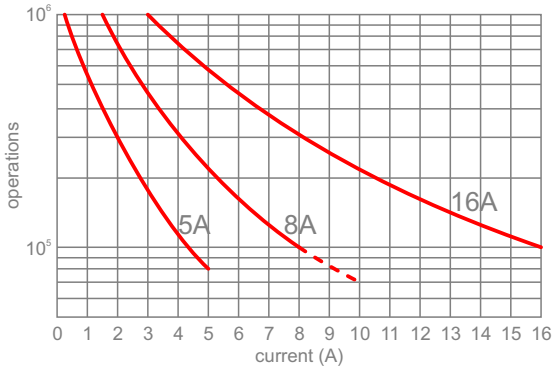
# Load limits

Nominal relay current is given for a resistive AC load. Real-life devices come with all sorts of trouble: transients, capacitive or inductive load, and non-linear voltage/current relation. To ensure the optimal service life, output current must be derated. Derating depends on load type, AC or DC voltage and required number of operations. Ignoring the guidelines may result in premature wear, contact sticking, overheating or destruction. Minimum recommended current is 100mA, otherwise oxidation layer buildup may rise contact resistance.

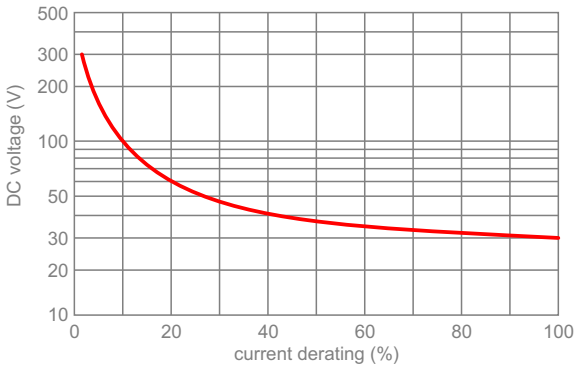
| Relay contact | 16A NO | 16A NC | 8A | 5A |
|---|---|---|---|---|
| LED LAMP | | | | |
| Compact E14/E27/GU10 | 700W | 400W | 400W | N/A |
| Stripe or panel with electronic transformer | 700W | 400W | 400W | N/A |
| INCADESCENT LAMP | | | | |
| Incadescent / halogen 230V | 1800W | 1000W | 800W | 300W |
| Halogen 12/24V with electronic transformer | 700W | 400W | 400W | N/A |
| FLUORESCENT LAMP | | | | |
| Compact fluorescent E14/E27 | 700W | 400W | 400W | 100W |
| With electronic ballast | 700W | 400W | 400W | 100W |
| With parallel compensation | 500W/80uF | 300W/50uF | 250W/30uF | N/A |
| Duo (lead-lag) connection | 1800W | 1000W | 1000W | 300W |
| GAS DISCHARGE LAMP | | | | |
| Mercury/sodium-vapor without compensation | 700W | 400W | 400W | 150W |
| Mercury/sodium-vapor with parallel compensation | 400W/50uF | 250W/30uF | 250W/30uF | N/A |
| Metal-halide (HID) without compensation | 700W | 400W | 400W | 150W |
| Metal-halide (HID) with parallel compensation | 400W/50uF | 250W/30uF | 250W/30uF | N/A |
| ELECTRIC MOTOR | | | | |
| single-phase asynchronous motor | 1200W | 600W | 600W | N/A |
| brushed DC electric motor | 1000W | 500W | 500W | N/A |

With the rated load, expected contact life is 20,000 cycles. With 50% load, expectancy goes to 100,000 cycles.

Contact life vs. current (resistive load)




DC breaking capability




Transient burst

Caused by: load capacitance
Overload ratio: 100..1000x
Typical duration: 10..100us
Solution: RC network, derating

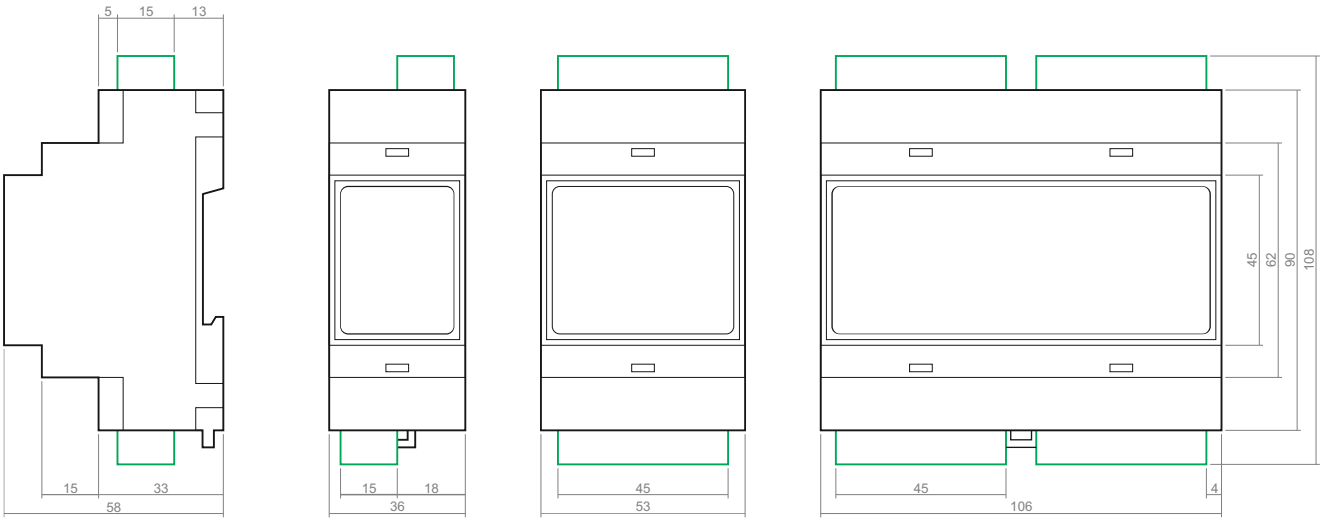
Surge current

Caused by: non-linear load
Overload ratio: 5..10x
Typical duration: 10..20ms
Solution: derating

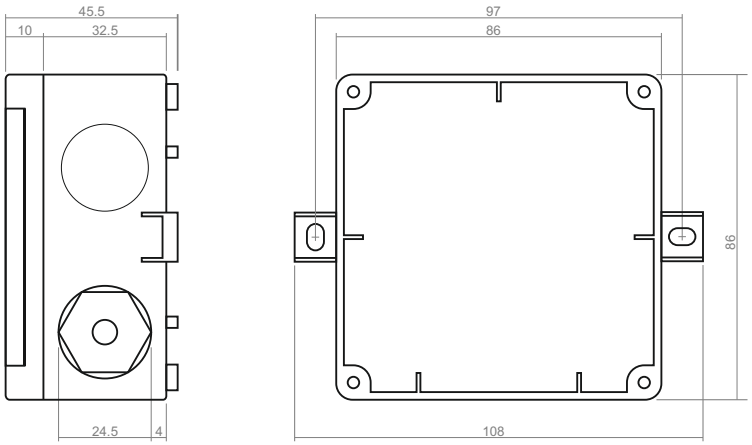
Break sparking

Caused by: load inductance
Overvoltage: 100..1000V
Typical duration: 5..20us
Solution: surge protector, derating

# Dimensions




2M 3M 6M



## По вопросам продажи и поддержки обращайтесь:

Архангельск (8182)63-90-72
Астрахань (8512)99-46-04
Барнаул (3852)73-04-60
Белгород (4722)40-23-64
Брянск (4832)59-03-52
Владивосток (423)249-28-31
Волгоград (844)278-03-48
Вологда (8172)26-41-59
Воронеж (473)204-51-73
Екатеринбург (343)384-55-89
Иваново (4932)77-34-06
Ижевск (3412)26-03-58
Иркутск (395)279-98-46
Казань (843)206-01-48
Калининград (4012)72-03-81
Калуга (4842)92-23-67
Кемерово (3842)65-04-62
Киров (8332)68-02-04
Краснодар (861)203-40-90
Красноярск (391)204-63-61
Курск (4712)77-13-04
Липецк (4742)52-20-81
Магнитогорск (3519)55-03-13
Москва (495)268-04-70
Мурманск (8152)59-64-93
Набережные Челны (8552)20-53-41
Нижний Новгород (831)429-08-12
Новокузнецк (3843)20-46-81
Новосибирск (383)227-86-73
Омск (3812)21-46-40
Орел (4862)44-53-42
Оренбург (3532)37-68-04
Пенза (8412)22-31-16
Пермь (342)205-81-47
Ростов-на-Дону (863)308-18-15
Рязань (4912)46-61-64
Самара (846)206-03-16
Санкт-Петербург (812)309-46-40
Саратов (845)249-38-78
Севастополь (8692)22-31-93
Симферополь (3652)67-13-56
Смоленск (4812)29-41-54
Сочи (862)225-72-31
Ставрополь (8652)20-65-13
Сургут (3462)77-98-35
Тверь (4822)63-31-35
Томск (3822)98-41-53
Тула (4872)74-02-29
Тюмень (3452)66-21-18
Ульяновск (8422)24-23-59
Уфа (347)229-48-12
Хабаровск (4212)92-98-04
Челябинск (351)202-03-61
Череповец (8202)49-02-64
Ярославль (4852)69-52-93

Киргизия (996)312-96-26-47
Казахстан (7273)495-231
Таджикистан (992)427-82-92-69

**Единый адрес для всех регионов: chy@nt-rt.ru || https://cybrotech.nt-rt.ru/**