

DESCRIPTION

Digital I/O expansion modules. The digital I/O expansion modules for use with Brodersen fieldbus and telemetry intelligent modules in the Series 2000 and 4000.

VERSIONS / ORDERING CODES

Type
UCL

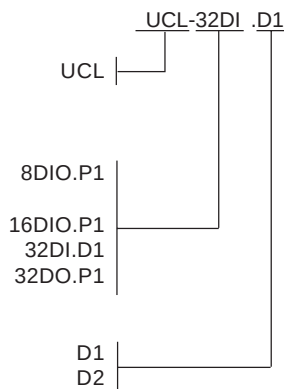
Input/Output

8 digital input/
8 digital output
16 digital input /
16 digital output
32 digital input
32 digital output

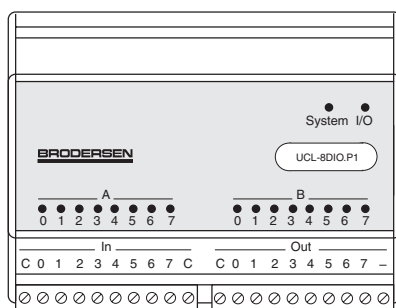
Input voltage range

24V DC (10 – 30V)
48V DC (30 – 60V) *

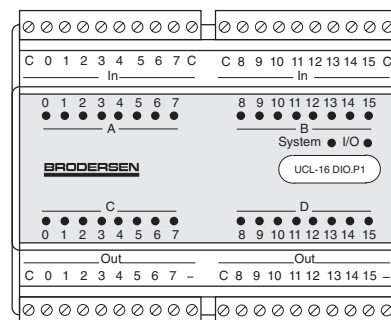
*) Only 32DI.D2



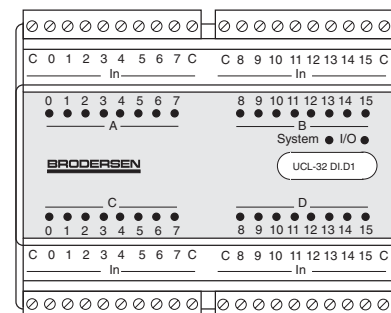
UCL-8DIO.P1



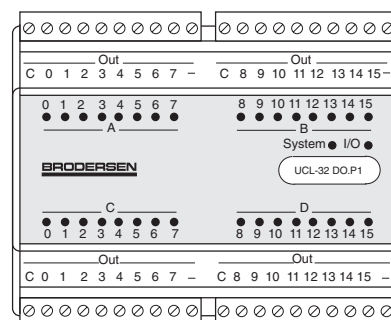
UCL-16DIO.P1



UCL-32DI.D1



UCL-32DO.P1



DI/DO Expansion Modules

UCL-xx

TECHNICAL DESCRIPTION

Input/output

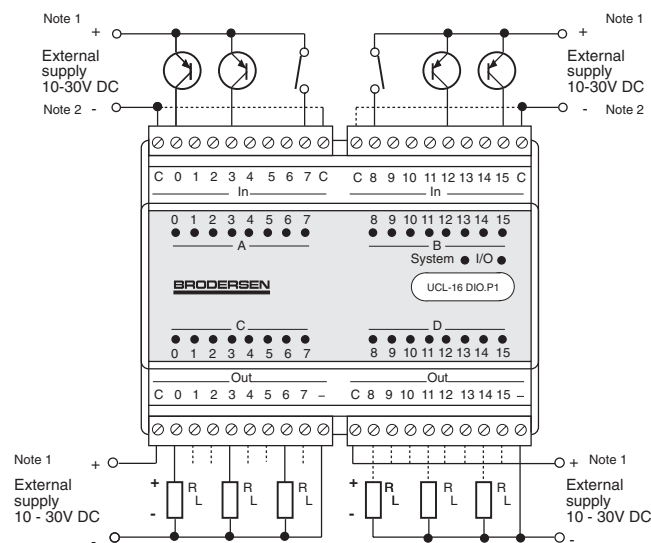
The Expansion I/O modules basic I/O fit can include up to 32 input/output terminals. Among the options available are:

Version	UCB-	8DIO	16DIO	32DI	32DO
Digital inputs (10-30V DC)		8	16	32	0
Digital outputs (PNP o. c.)		8	16	0	32

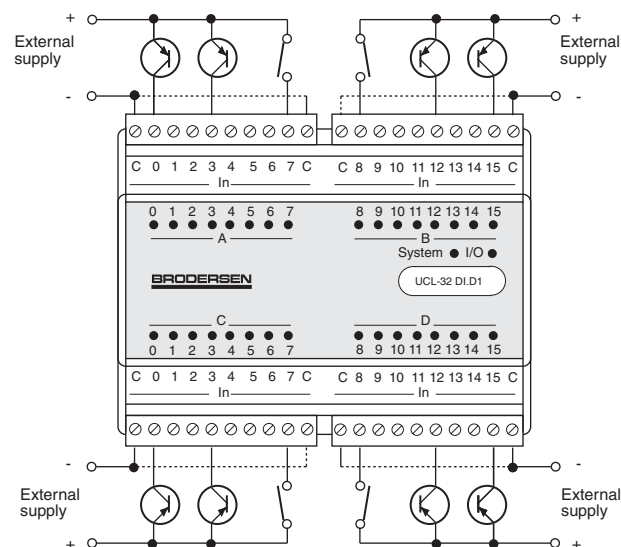
All digital I/O's are equipped with opto-couplers.

Wiring Diagram

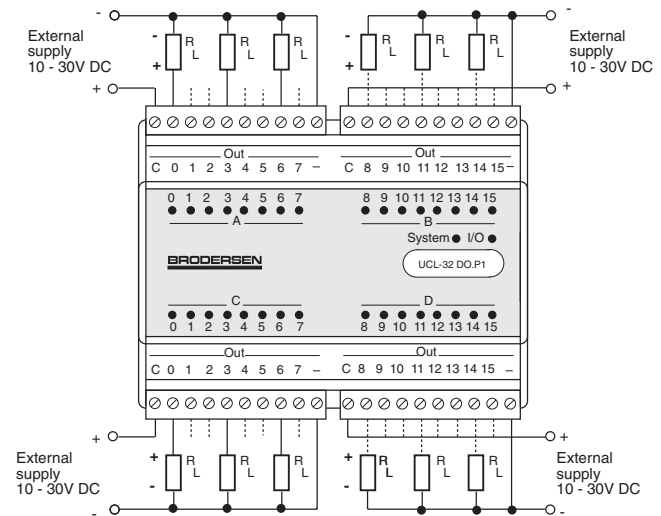
UCL-16DIO/8DIO



UCL-32DI



UCL-32DI



Local bus connections

The I/O expansion module is connected to the intelligent module and additional expansion modules using the local bus connector on the left and right top side of the module. 8 pole RJ connector cable is used. Technical details of the local bus and wiring detail can be ordered from your module supplier.

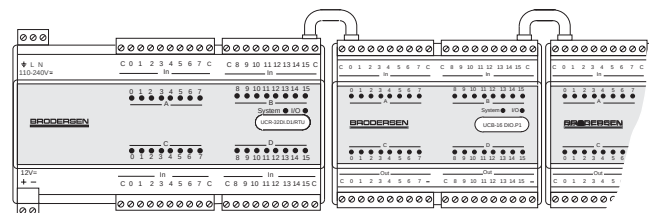
A range of appropriate cables for adding expansion modules is available.

Length of local bus cable is max. 50cm.

I/O expansion general

The basic I/O fit of the Series 2000/4000 Slaves can be expanded by attaching the System expansion modules.

Example: BITBUS slave with expansion modules



In general several expansion modules are available with the following I/O configurations:

- 8-32 10-30V inputs
- 8-32 10-30 V PNP (or NPN) open collector outputs
- 8 230V inputs / 8 230V outputs (potential free relay)
- 4-8 analogue inputs (0-10V, 4-20mA, etc.)
- 8 Thermo coupled inputs (J, K, R, S, T type)
- 8 Pt-100, Pt-500 or Pt-1000 RTD inputs
- 4 analogue outputs (0-10V, 4-20mA, etc.)

In the event that the current consumption of the expansion modules exceeds the capability of the power supply, an additional power supply must be inserted.

DIGITAL INPUT/OUTPUT

Inputs: 32 (negative common, PNP)
All equipped with optocouplers.

24V (D1):
 Input voltage activated: 10 - 30V DC, note 1.
 Input voltage deactivated: Max. 3V DC.
 Input current: 12V DC: Typical 3mA
 24V DC: Typical 6mA

48V (D2):
 Input voltage activated: 30 - 60V DC, note 1, 3.
 Input voltage deactivated: Max. 6V DC.
 Input current: 48V DC: Typical 4mA

Input delay: Typical 5ms.

Outputs:
 External voltage: 10 - 30V DC (note 2).
 Output voltage drop: Max. 1.5V (output activated).
 Output current: Max. 0.5A.
 Output peak current: Max. 5A in 1 second (note 2).
 Output leakage current (off): Max. 0.5mA.
 Output delay: Max. 1ms.

Isolation
 (input or output to electronics,
 input to output): 1kV AC.

Indicators:
 Digital input: One for each digital input (red)
indicating active input.
 Digital output: One for each digital output (yellow)
indicating active output.

GENERAL

Current consumption (12V) :
 UCL-16DIO: max. 105mA.
 UCL-32DI: max. 90mA.
 UCL-32DO: max. 120mA.

Ambient temperature: -10 - +55°C.

EMC: EN 50081-1/EN50082-2.

Climatic:
 Dry heat: IEC 68-2-2, Test Bd, Temp. +55°C,
Duration 8h.
 Cold: IEC 68-2-1, Test Ad, Temp. -10°C,
Duration 8h.
 Damp heat: IEC 68-2-3, Test Ca, Temp. 40°C,
RH 95%, Duration 8h.

Mechanical:
 Vibration: IEC 68-2-6, Test Fc (sinusoidal),
Freq. 10-150Hz, Amp.
4g, 5 sweeps in 3 orthogonal axes.

Shock: IEC 68-2-27 (half sine), Acc. 15g,
Pulse time 11msec., 3 x 6 shocks.

Protection: IP20.

Mounting: 35 mm DIN-rail, EN50022.

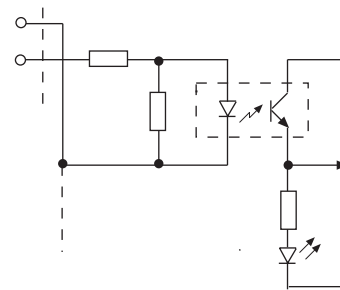
Terminals: Max. 1.5 mm² wire.

Housing: Anodized aluminium with plastic ends.
According to DIN 43880.

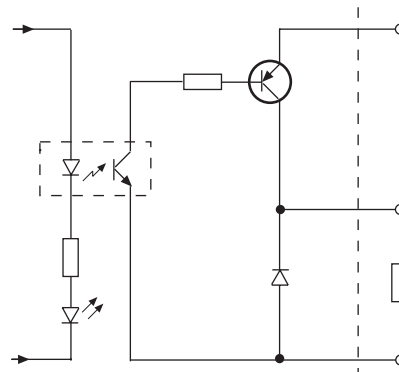
Dimensions:
 HxWxD: 80 (+connectors)x108x62mm

CIRCUIT CONFIGURATION (DIGITAL)

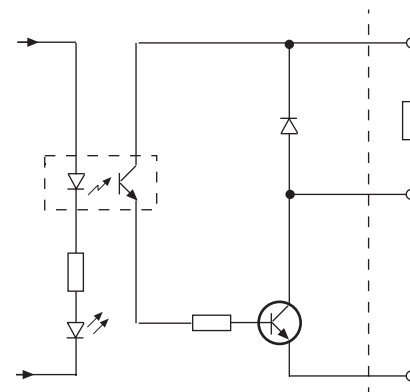
Input



Output PNP



Output NPN



DI/DO Expansion ModulesUCL-xx

NOTES/REMARKS

- 1) The polarity at the input must be positive. The common terminal must be connected to the negative.
- 2) Input signals exceeding the maximum values **MAY CAUSE PERMANENT DAMAGE** to the module.
- 3) The 12V external supply is not isolated from the circuit supplying the electronics. It is therefore recommended to use an external source for the I/O if the I/O signals are influenced by electrical noise, e.g. from long cables or inductive load.
- 4) The sum of current consumed from the 12V rail, i.e. internal consumption, consumption from the external screw terminals and by expansion modules at the local bus, must never exceed the maximum total output current.

DESCRIPTION

Expansion module with 8 isolated digital inputs for direct connection to AC mains voltage.

VERSIONS/ORDERING CODES

Type:

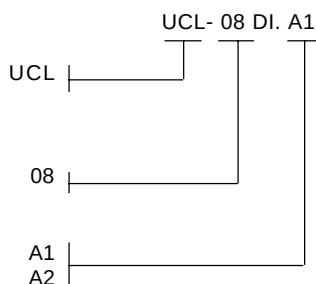
Expansion module:

Digital input/output:

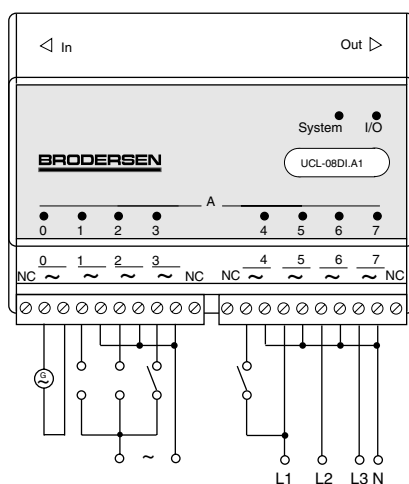
Number of inputs
8

Input voltage range

100 - 265V AC
30-265V AC, note 4



WIRING DIAGRAM



Note 2

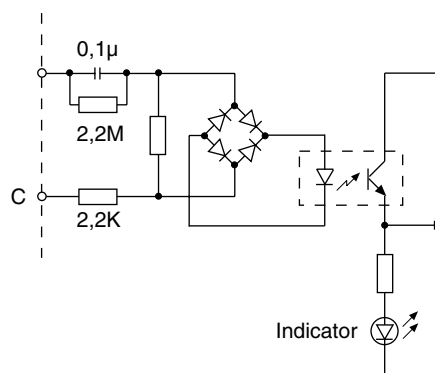
TECHNICAL DATA

Inputs:	8, note 1 All equipped with optocouplers.
Input voltage activated:	A1: 100 - 265V AC, note 3 A2: 30-265V AC, note 3 and 4.
Input voltage deactivated:	A1: 0 - 40V AC A2: 0-8V AC
Input frequency:	40 - 70Hz
Input current:	Typical 8mA:(220V AC/50 Hz)
Input delay:	50 - 100mS
Isolation:	Between inputs: Min. 1.5kV AC Input to electronics: Min. 4kV AC Input to chassis: Min. 2kV AC
Indicators:	One (red) for each input indicating input, active.
Current consumption (12V):	Max. 45mA

NOTES/REMARKS

- Inputs are isolated from each other.
- Terminals marked "NC" are not connected internally.
- Voltages/currents exceeding the maximum values may cause permanent damage.
- Note that short wiring must be used in order to avoid unexpected input activation due to capacitive coupling in the cable.

CIRCUIT CONFIGURATION



DESCRIPTION

Expansion module with 8 potential free relay outputs.

VERSIONS/ORDERING CODES

Type:

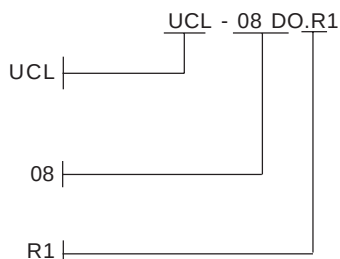
Expansion module

Digital input/output:

Number of outputs
8

Output type

Relay 240V/8A AC



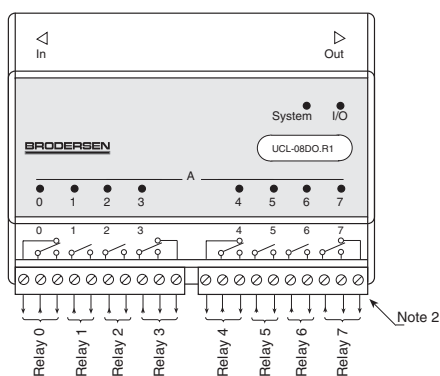
TECHNICAL DATA

Outputs:	4 potential free SPDT-C/O contacts, note 2. 4 potential free SPST-N/O contacts.
Output voltage :	Max. 240V AC, note 1.
Output current:	Max. 8A AC (resistive), note 1
Output delay:	Typical 10ms.
Lifetime (relay):	Min. 100.000 operations at rated load.
Contact material:	AgCd (gold clad).
Isolation:	4kV AC electronics to contact, or chassis. 1.5kV contact to another contact.
Indicators:	One for each output (yellow) indicating output active.
Current consumption (12V):	Stand by (all relays deactivated): Typically 20 mA. Additional per relay activated: 20-25 mA. Total current consumption: Max. 200 mA.

NOTES/REMARKS

- 1) Voltages/currents exceeding the maximum values may cause permanent damage.
- 2) SPDT only available in revision C or later.

WIRING DIAGRAM



DESCRIPTION

8 channel analog input expansion module for standardized process signals.

VERSIONS/ORDERING CODES

Type:

Expansion module

Analog input/output:

Number of inputs
8

Input range

0 - 10V/0-20mA, note 5

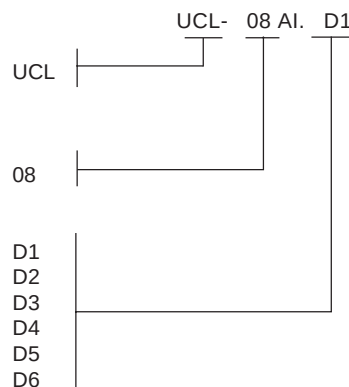
4 - 20mA

0 - 5V

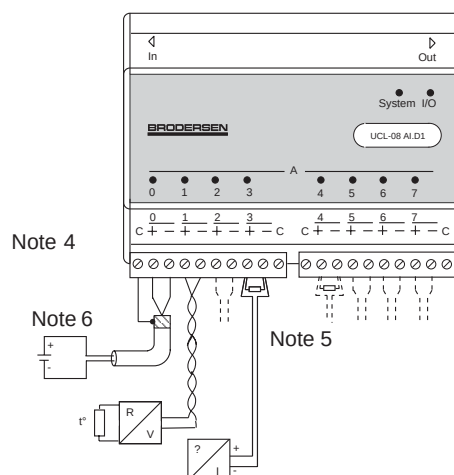
-5V - 0 - +5V

-10V - 0 - +10V

0 - 20mA



WIRING DIAGRAM



TECHNICAL DATA

Inputs:
(note3).

8 multiplexed analog channels

Input configuration:

Differential (+/-).

Input measuring ranges:

Type no. code	Voltage input	Current input
.D1	0-10V	0-20mA
.D2		4-20mA
.D3	0-5V	
.D4	-5V - 0 - +5V	
.D5	-10V - 0 - +10V	
.D6		0-20mA

Resolution:

12 bit (note 2).

Input impedance:

Voltage: 100kOhm
Current: D1: 500Ohm (note 5)
D2/D6: 100Ohm

Absolute maximum ratings (note 1):

Input voltage: $\pm 40V$ DC
Input current: $\pm 30mA$ DC

Conversion time:

Max. 0.4ms per channel (note 3).

Update time (all channels):

Max.: 0.5ms + 8 x local scan interval.

Measuring accuracy voltage: $\pm 0.2\% \pm 4LSB$ (typical $0.05\% \pm 1LSB$)

Measuring accuracy current: $\pm 0.2\% \pm 4LSB$ (typical $0.1\% \pm 2LSB$).

Linearity:

Better than $\pm 1LSB$.

Temperature stability:

Better than $\pm 25ppm/^{\circ}C$ (typical).

Common mode input voltage: Max. $\pm 13V$ DC (note 4).

Common mode rejection ratio: Min. 60dB (typical 72dB).

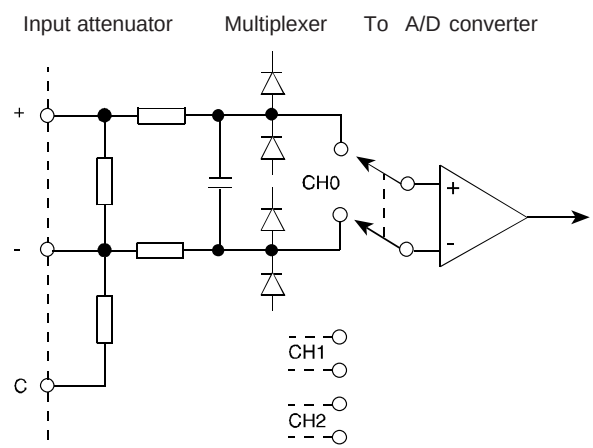
Isolation (input to electronics): 500V DC (note 4).

Indicators:

One (red) for each channel indicating input active. (note 3).

Current consumption (12V): Max. 180mA.

CIRCUIT CONFIGURATION

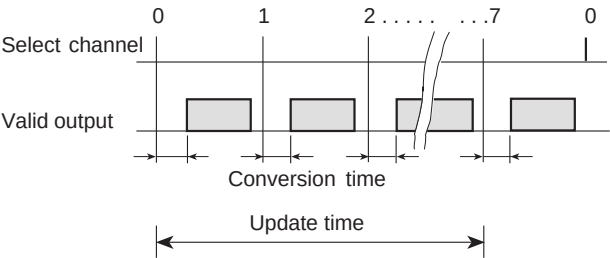


Analog input

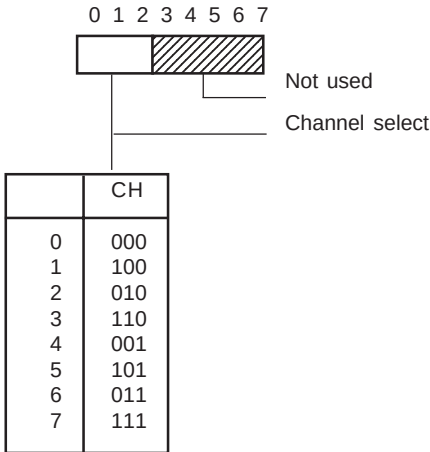
Analog input, 8 channels UCL - 08 AI.D*

NOTES/REMARKS:

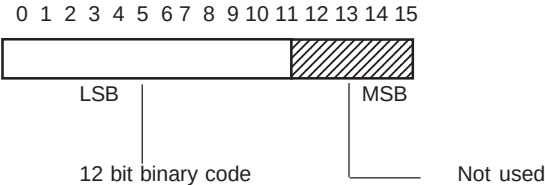
- 1) Input signals exceeding the maximum values **MAY CAUSE PERMANENT DAMAGE** to the module.
- 2) The value in the PC (or PLC) is represented by an integer (binary number) from 0 to 4095 depending on the input signal, see table below.
- 3) Only one input channel is active at a time. Connected to a Serie 2000 slave module (UCB ...) the multiplexing is automatically done by the slave module and the input values are transferred via the bitbus to the PC as 8 separate values. The total conversion time is equal to 8 times the local scan time at the slave module.



The active channel is selected by 8 bits (output) as shown below.

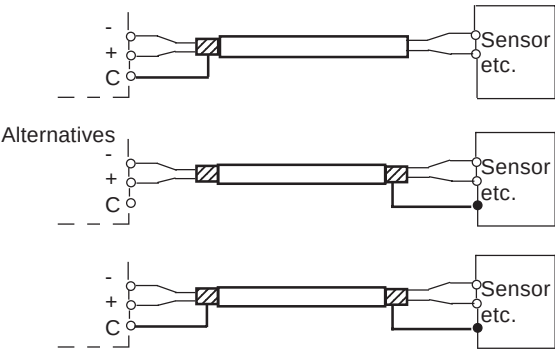


The input value is presented as 16 bits (input) as shown below.



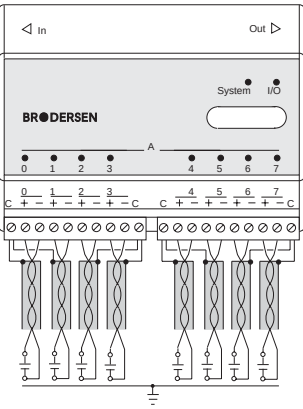
- 4) The individual inputs are **NOT ISOLATED** from each other. The voltage measured from the common (C) terminal to any other terminal may not exceed $\pm 13V$. The 4 common (C) terminals are internally connected.
- 5) External resistor (500Ohm) to be mounted for 0 - 20mA input. **Note:** The parallel internal resistance (R_i) has to be added and compensated out in the application software.
- 6) Depending on the noise level versus signal level, shielded cables and/or twisted pairs might be necessary. The shield of the cable should normally be connected to common (C) of the Serie 2000 modules. Unfortunately no general rule can be given, only experiments in the actual application can give the best solution to noise problems.

RECOMMENDED SOLUTION

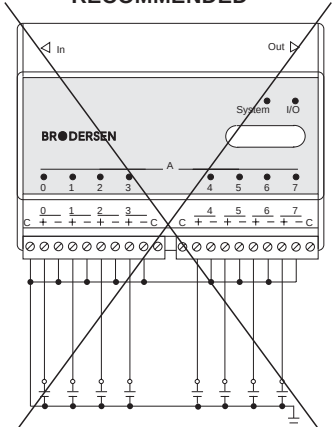


PLEASE NOTE that common paths (ground or signal) should be avoided. Please also note that signal ground and safety ground are two entirely different subjects.

RECOMMENDED WIRING



ABSOLUTELY NOT RECOMMENDED



INPUT TABLE

Integer (binary value) = $\frac{\text{Input} - \text{range MIN}}{R}$
where R is the resolution (LSB).

Input range						Integer (Binary- code)
0-10V	0-5V	-5V-0 - +5V	-10V-0 - +10V	0-20mA	4-20mA	
Input [V]				Input [mA]		
<0	<0	<-5	<-10	<0	<4.0	0
0	0	-5	-10	0	4.0	0
1	0.5	-4	-8	2	5.6	410
2	1.0	-3	-6	4	7.2	819
3	1.5	-2	-4	6	8.8	1229
4	2.0	-1	-2	8	10.4	1638
5	2.5	0	0	10	12.0	2048
6	3.0	+1	+2	12	13.6	2457
7	3.5	+2	+4	14	15.2	2867
8	4.0	+3	+6	16	16.8	3276
9	4.5	+4	+8	18	18.4	3686
10	5.0	+5	+10	20	20.0	4095
>10	>5.0	>+5	>+10	>20	>20.0	4095
2.442mV	1.221mV	2.442mV	4.884mV	4.884uA	3.907uA	Resolution

DESCRIPTION

4 Channel analog output expansion module for standardized process signals.

VERSIONS/ORDERING CODES

Type:

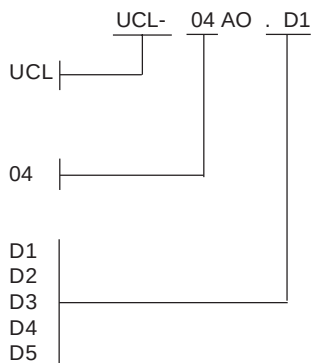
Expansion module

Analog input/output:

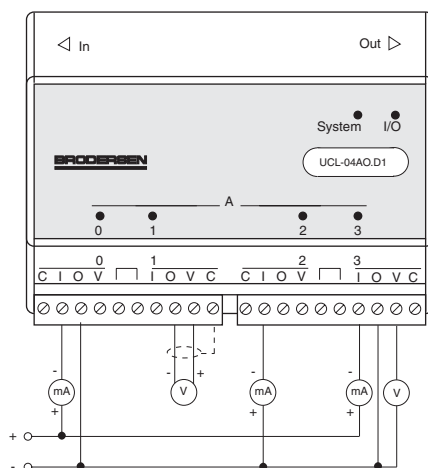
Number of outputs
4

Output range

0 - 10V/0 - 20mA
0 - 10V/4 - 20mA
0 - 5V/0 - 20mA
-5V - +5V/0-20mA
-10V - +10V/0 - 20mA



WIRING DIAGRAM



TECHNICAL DATA

Number of outputs: 4 channels

Indicators: One (yellow) for each channel

Output configuration: Separate terminal for voltage and current output for each channel (note 1).

Resolution: 12 bit (note 5)

Output ranges:

Type no. code	Voltage output	Current output
.D1 .D2	0 - 10V 0 - 10V	0 - 20mA 4 - 20mA
.D3 .D4 .D5	0 - 5V -5V - 0 - +5V -10V - 0 - +10V	0 - 20mA 0 - 20mA 0 - 20mA

Voltage output:

Output impedance: Max. 200ohm
Output current: Max. 5mA (note 2)
Settling time: Typical 20us (within 0.1% FSR)
Slew rate: Typical 5V/us
Accuracy: Gain: $\pm 0.3\%$ of FSR (typical 0.1%)
Offset: $\pm 0.3\%$ of FSR (typical 0.1%)
Temperature stability: Better than $\pm 30\text{ppm}/^\circ\text{C}$

Current output:

Output impedance: Min. 5Mohm
External supply voltage: 10 - 30V DC (note 2)
External load impedance: 12V: max. 400ohm
24V: max. 800ohm (note 3)
Settling time: Typical 100us (within 0.1% of FSR)
Slew rate: Typical 2mA/us
Accuracy: Gain: $\pm 0.7\%$ of FSR (typical 0.2%)
Offset: $\pm 0.5\%$ of FSR (typical 0.2%)
Temperature stability: Better than $\pm 80\text{ppm}/^\circ\text{C}$

Update time (all channels): 1ms + 4 x local scan interval

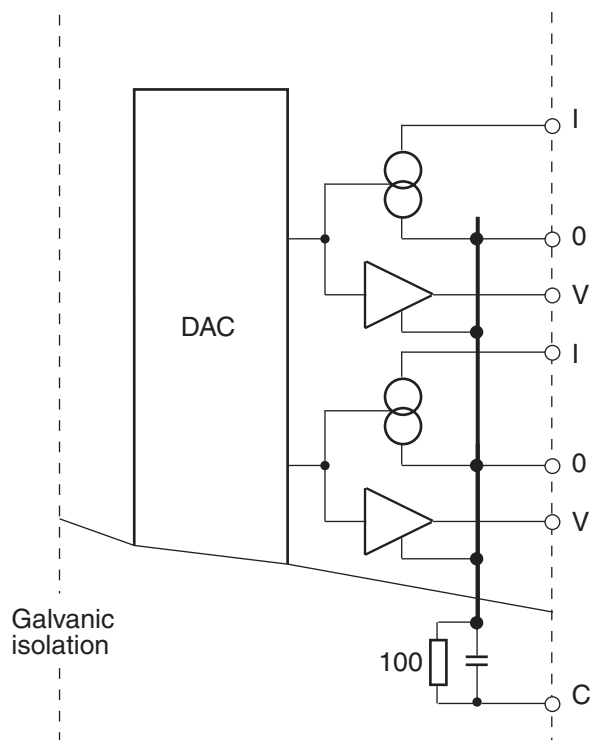
Isolation (output to electronics): 500V DC

Module current consumption: Max. 300mA

Analog output

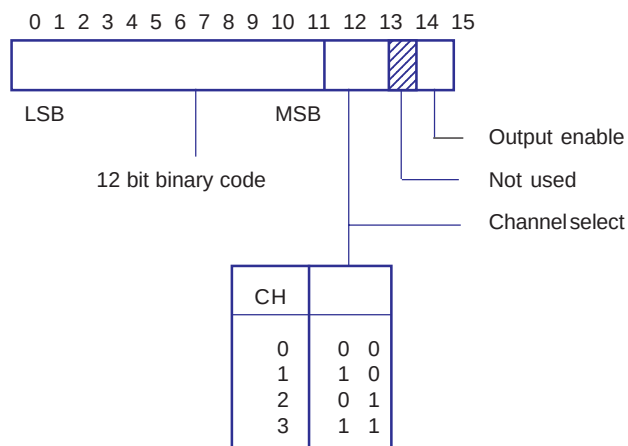
Analog output, 4 channels UCL - 04 AO.xx

CIRCUIT CONFIGURATION



NOTES/REMARKS

- 1) The output can be used for current and voltage simultaneously.
- 2) Currents or voltages exceeding the maximum values **MAY CAUSE PERMANENT DAMAGE** to the module. The outputs are short circuit protected.
- 3) The current for a connected device must be supplied externally. The voltage must be selected to be able to fulfil the specification for the external device. For external voltages > 20V the load impedance **MUST** be > 400 ohm.
- 4) All "0" and "C" terminals must be kept on the same potential as they are internally connected. The 4 channels in the module are **NOT** isolated from each other.
- 5) The module is controlled by a 16 bit word as shown below.



The output values are automatically transferred one by one to the module when connected to a UCX- ... slave module.

The output value is selected by an integer 0 to 4095 (12 bit binary code).

Output value = range MIN + R x X

Where X is the digital value(0 to 4095) and R is the resolution.

When the output enable is set to "0" all outputs are set to 0mA and 0V, except 4 - 20mA output which is set to 4mA. If an UCX-... slave module recognizes a system error the outputs are automatically disabled.

Integer (binary code)	Output range					
	0 - 10V	0-5V	-5V-0-+5V	-10V-0-+10V	0 - 20mA	4 - 20mA
	Output [V]				Output [mA]	
0	0	0	-5	-10	0	4.0
410	1	0.5	-4	-8	2	5.6
819	2	1.0	-3	-6	4	7.2
1229	3	1.5	-2	-4	6	8.8
1638	4	2.0	-1	-2	8	10.4
2048	5	2.5	0	0	10	12.0
2457	6	3.0	+1	+2	12	13.6
2867	7	3.5	+2	+4	14	15.2
3276	8	4.0	+3	+6	16	16.8
3686	9	4.5	+4	+8	18	18.4
4095	10	5.0	+5	+10	20	20.0
Resolution	2.442mV	1.221mV	2.442mV	4.884mV	4.884uA	3.907uA

DESCRIPTION

8 Channel analog input expansion module for standardized temperature sensors.

VERSIONS/ORDERING CODES

Type:

Expansion module

Analog input/output:

Number of inputs

8

Input range

Pt-100

-50 - +100°C

-50 - +300°C

-50 - +850°C

Pt-500

-50 - +100°C

-50 - +300°C

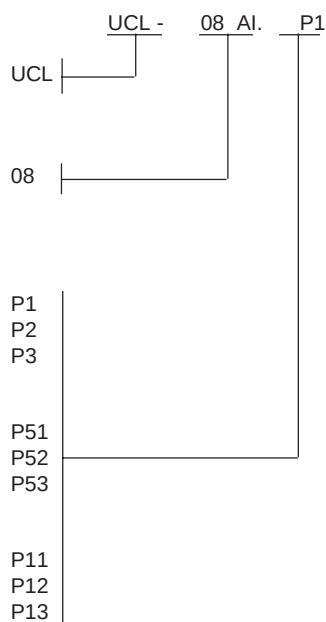
-50 - +850°C

Pt-1000

-50 - +100°C

-50 - +300°C

-50 - +850°C



TECHNICAL DATA

Number of inputs: 8 multiplexed analog channel (note 3).

Input configuration: 3 wire (or 2 wire).

Indicators: One (red) for each channel indicating that the input is active. (note 3).

Input measuring ranges:

Sensor type (note 1)			Range
Pt-100	Pt-500	Pt-1000	
P1	P51	P11	-50 - + 100°C
P2	P52	P12	-50 - + 300°C
P3	P53	P13	-50 - + 850°C

Resolution: 12 bit (note 2).

Conversion/settling time: Max. 60ms per channel (note 3).
Max. 0.5s.

Measuring accuracy: Better than $\pm 0.5\%$ of FSR

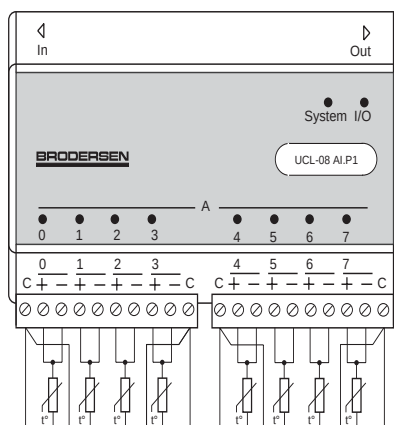
Linearity: Better than $\pm 0.1\%$ of FSR (note 5).

Temperature stability: Better than $\pm 100\text{ppm}/^{\circ}\text{C}$ (typical).

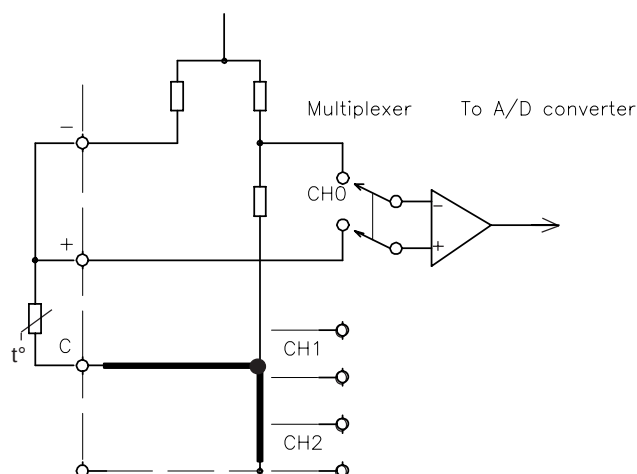
Isolation
(input to electronics): 500V DC (note 4).

Module current consumption: Max. 200mA.

WIRING DIAGRAM



CIRCUIT CONFIGURATION



Analog input

Analog input, 8 channels Pt-100, 500, 1000 temperature sensors UCL - 08 AI.Px

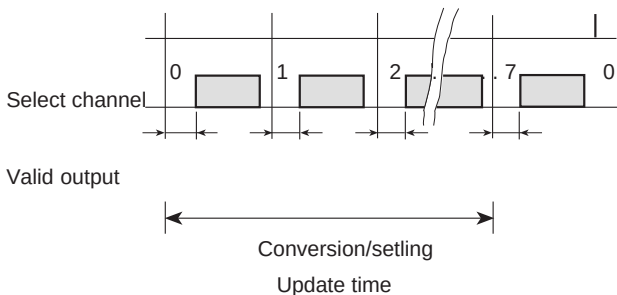
NOTES/REMARKS

- 1) Resistance according to DIN 43760/IEC 751 ($\alpha = 0.00385$).
- 2) The value in the PC (or PLC) is represented by an integer (binary number) from 0 to 4095 depending on the temperature, see table below.

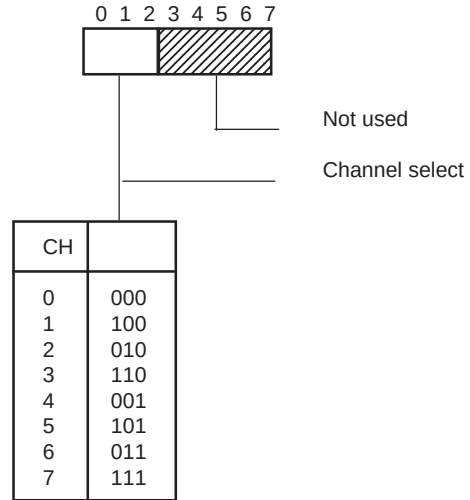
Temperature	Range		
	-50 - 100°C	-50 - 300°C	-50 - 850°C
Integer (binary code)			
<-50	0	0	0
-50	0	0	0
-25	683	293	114
0	1365	585	228
25	2048	878	341
50	2730	1170	455
75	3413	1463	569
100	4095	1755	683
125	4095	2048	796
150	:	2340	910
200	:	2925	1138
250	:	3510	1365
300	:	4095	1593
400	:	4095	2048
500	:	:	2275
600	:	:	2730
700	:	:	3413
850	:	:	4095
>850	:	:	4095
Resolution	0.03663°C	0.08547°C	0.21978°C

Integer (binary value) = $\frac{\text{Input-range} - \text{min}}{R}$, where R is the resolution.

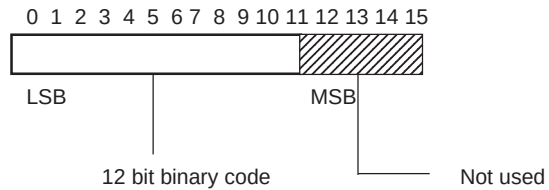
- 3) Only one input channel is active at a time. Connected to a Series 2000 slave module (UCB-...) the multiplexing is automatically done by the slave module and the input values are transferred via the bitbus to the PC as 8 separate values. Because of the settling time, an input must be selected more than 50 ms before reading the value.



The active channel is selected by 8 bits (output) as shown below.



The input value is presented as 16 bits (input) as shown below.



- 4) The individual inputs are **NOT ISOLATED** from each other. The 4 common (C) terminals are internally connected.
- 5) The linearization of the sensor is carried out by the Series 2000 slave module (UCB-xx). If the module is used with other equipment the user must correct for the non linearity of the sensor.

DESCRIPTION

The UCL-08AI.J/K/R/S/T are expansion modules with direct interface for thermo coupled temperature sensors.

When using the modules in connection with Series 2000 master or slave modules, the master or slave module will automatically linearise the measuring values.

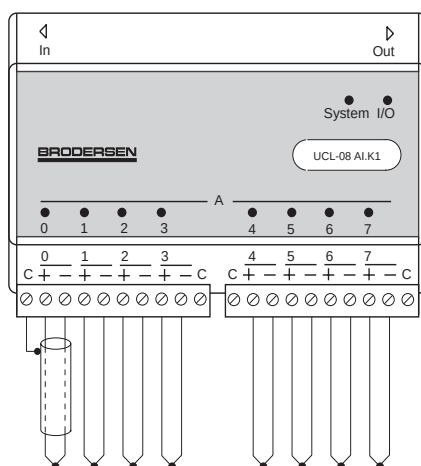
The module includes cold junction compensation circuit.

VERSIONS/ORDERING CODES

Type	UCL-08 AI K1
Expansion module	UCL
Number of inputs 8 inputs	08
Input type Analog input	AI
Sensor/input range	
Fe-CuNi (J): -50 - 1200°C	J1
NiCr-Ni (K) -50 - 1350°C	K1
0- 600°C	K2*
PtRh-Pt 13% (R) -50 - 1750°C	R1
PtRh-Pt 10% (S) -50 - 1750°C	S1
Cu-Cu-Ni (T) 0- 300°C	T1*

* See note 5

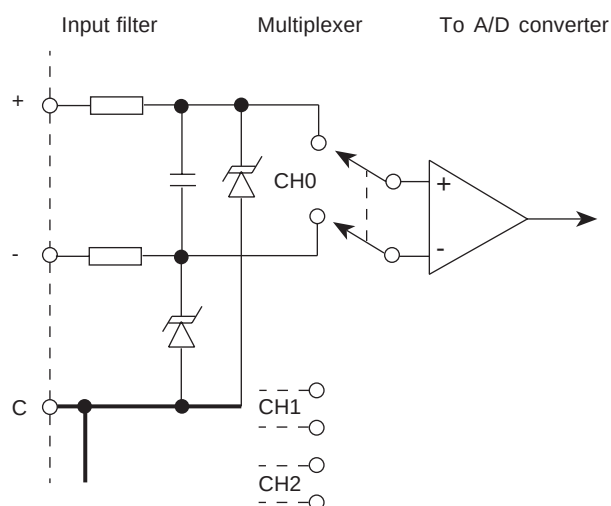
WIRING DIAGRAM



TECHNICAL DATA

Number of inputs:	8 analog channels (multiplexed), note 1
Input configuration:	Differential (+/-)
Indicators:	One (red) for each channel indicating that the input is active. (note 3).
Input range/sensor type:	Fe-CuNi (J): -50 - 1200°C NiCr-Ni (K): -50 - 1350°C PtRh-Pt 13% (R): -50 - 1750°C PtRh-Pt 10% (S): -50 - 1750°C Cu-CuNi (T): 0- 300°C
Resolution:	12 bit
Accuracy:	Better than 0.5% of FSR. K2+T1: Better than 1,5% of FSR.
Linearity:	Better than 0.1% of FSR.
Conversion/settling time:	Max. 60ms per channel. Max. 0.5s.
Temperature stability:	Better than $\pm 100\text{ppm}/^\circ\text{C}$ (typical).
Common mode rejection (50/60Hz), note 4:	J1/K1: > 60dB R1/S1/K2: > 50dB T1: > 45dB
Common mode input voltage:	max. $\pm 10\text{V}$.
Absolute maximum input voltage:	$\pm 12\text{V}$, note 3.
Cold point compensation:	Better than $\pm 0.06^\circ\text{C}$ per $^\circ\text{C}$.
EMC:	EN50081-1, EN50082-2.
Isolation (input to electronics):	500V DC (note 4).
Module current consumption:	Max. 200mA.

CIRCUIT CONFIGURATION



Analog input

Analog input, 8 ch. thermo coupled sensors UCL-08AI.J/K/R/S/T

CONVERSION TABLE

Temperature [°C]	Sensor type / SYSTEM 2000 database value				
	J	K1	K2	R/S	T1
<-50	0	0	0	0	0
-50	0	0	0	0	0
-25	82	73	0	57	0
0	164	146	0	114	0
25	246	219	171	171	341
50	328	293	341	228	683
100	491	439	683	341	1365
150	655	585	1024	455	2048
200	819	731	1365	569	2730
300	1147	1024	2048	796	4095
400	1474	1316	2730	1024	4095
500	1802	1609	3413	1251	4095
600	2129	1901	4095	1479	4095
700	2457	2194	4095	1706	4095
800	2785	2486	4095	1934	4095
1000	3440	3071	4095	2389	4095
1200	4095	3656	4095	2844	4095
1350	4095	4095	4095	3185	4095
1500	4095	4095	4095	3526	4095
1750	4095	4095	4095	4095	4095
>1750	4095	4095	4095	4095	4095
Resolution [°C]	0,30525	0,34188	0,14652	0,43956	0,07326

NOTES/REMARKS

- 1) Only one channel is active at a time. The Series 2000 slave or master module automatically multiplexes the 8 channels and delivers the 8 measuring values after linearisation to the Series 2000 database as 8 separate integers (0-4095).
- 2) The 8 inputs are not isolated from each other, but as a group isolated from other modules internal circuit.
- 3) Voltages exceeding the maximum voltage may **CAUSE PERMANENT DAMAGE** to the module.
- 4) As thermo couples deliver very small signals (uV), cables should be kept short and far away from other electrical installations especially circuits with high current or voltage or circuits known to produce electrical noise.
- 5) Ranges are only available with newer UCB-xx modules with B-CONW facilities.
Actual temperature tables are available on the IOTOOL32Pro CD for download into the modules. In order to reject noise and hum, the UCB/UCR modules integrate and average the input signal.
NOTE: The Remote Master module (RM) do NOT have this function!

DESCRIPTION

Series 2000 expansion module with 16 digital input 24V, 8 digital output (PNP open collector) and 4 analog inputs.

The 4 first digital inputs can be used as pulsed (counter) inputs (up to 100 Hz).

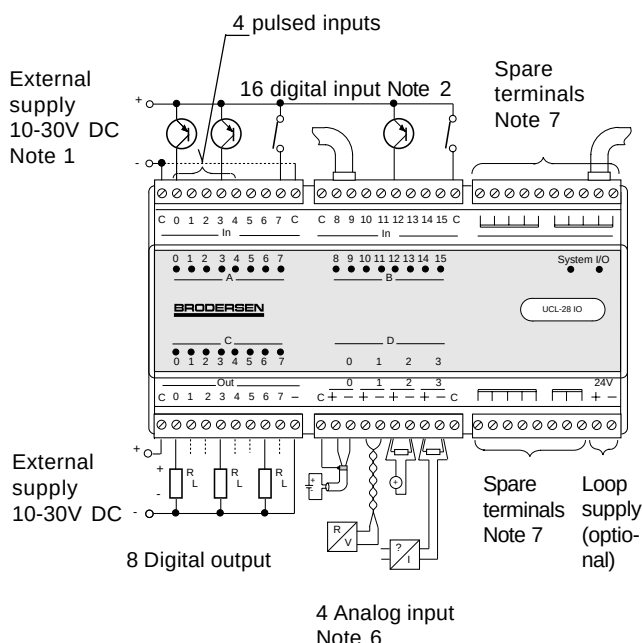
The analog inputs have galvanic isolation between the individual channels. Solid state relays are used for multiplexing the analog inputs.

The module is equipped with a micro controller taking care of the processing of the analog inputs and the counter inputs.

Isolated 24V supply (optional) are provided for e.g. 4-20mA analog inputloop.

VERSIONS/ORDERING CODES

Type: UCL	UCL	UCL- 28IO /01 .D1
Input/Output 16DI, 8DO, 4A	28	
Loop Power Supply (optional) No LPS 24V LPS 12V LPS	Blank /01 /02	
Analogue Input Range 0-10V/0-20mA 4-20mA 0-5V 0-20mA 0-2V	D1 D2 D3 D6 D7	



TECHNICAL DATA (ANALOG)

Inputs: 4 multiplexed analog channels with solid state multiplexer (note 5).

Input configuration: Differential (+/-), flying capacitor type.

Input measuring ranges:

Type no. code	Voltage input	Current input
.D1	0-10V	0-20mA
.D2		4-20mA
.D3	0-5V	
.D6		0-20mA
.D7	0-2V	

Resolution: 12 bit (note 5).

Input impedance: Voltage: D1: 100 kOhm
D3: 50 kOhm
D7: >100 kOhm
Current: D1: 500 Ohm (note 4)
D2/D6: 100 Ohm

Absolute maximum ratings (note 3):

Input voltage: $\pm 40V$ DC
Input current: $\pm 30mA$ DC

Sampling interval: 100 ms (note 5).

Measuring accuracy: 25°C: $\pm 0.2\% \pm 6LSB$ (typical) $0.05\% \pm 3LSB$
-10°-55°C: $\pm 0.3\% \pm 8LSB$ (typical) $0.1\% \pm 4LSB$.

Linearity: Better than $\pm 1LSB$.

Temperature stability: Better than $\pm 50ppm/^{\circ}C$ (typical).

Common mode input voltage: Max. $\pm 80V$ DC (note 1).

Common mode

rejection ratio: Min. 60dB (typical 72dB).

Series mode rejection: Min. 30dB (50-120Hz).

Isolation (input to input): 500V (note 1).

Loop supply (optional): 24V $\pm 5\%$ / max. 200mA.
(short circuit protected)
12V $\pm 5\%$ / max. 400mA.

Isolation: 500V AC.

Digital input/output

Combined analog input, digital I/O UCL-28 IO

TECHNICAL DATA (DIGITAL)

Inputs : 16 (negative common)
All equipped with optocouplers.

Input voltage activated: 10-30V DC, note 3.

Input voltage deactivated: Max. 3V DC.

Input current: 12V DC: Typical 3mA.

24V DC: Typical 6mA.

Input delay: Typical 1ms.

Pulsed (counter) inputs: 4 (digital input 0, 1, 2, 3).

Counting frequency: max. 100Hz (5ms pulse / 5ms pause).

Resolution: 12 bit (0-4095) note 9.

Outputs : 8 PNP open collector
All equipped with optocouplers.

External voltage (outputs): 10 - 30V DC, note 3.

Output voltage drop: Max. 1.5V (output activated).

Output current: Max. 0.5A.

Output peak current: Max. 5A in 1 second, note 3.

Output leakage current (off): Max. 0.5mA.

Output delay: Max. 1ms.

Isolation (input or output to electronics, input to output): 1kV AC.

Indicators: One for each digital input (red).
indicating active input.
One for each digital output (yellow).
indicating active output.

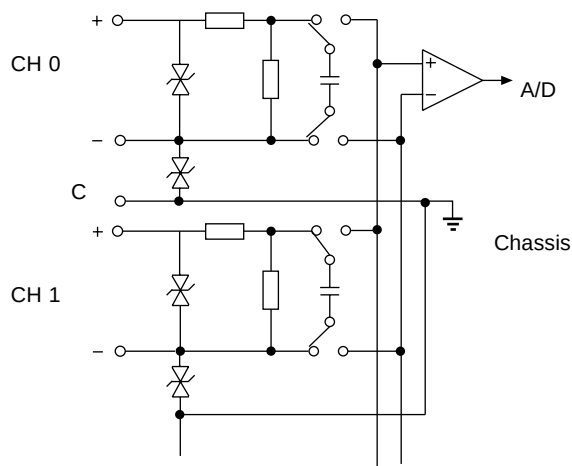
GENERAL

Current consumption (12V): Max. 80mA.

EMC: EN50081-1 / EN50082-2

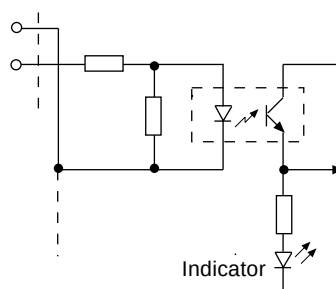
Dimensions: HxWxD: 80 (+connectors) x162x62 mm.

CIRCUIT CONFIGURATION (ANALOG)

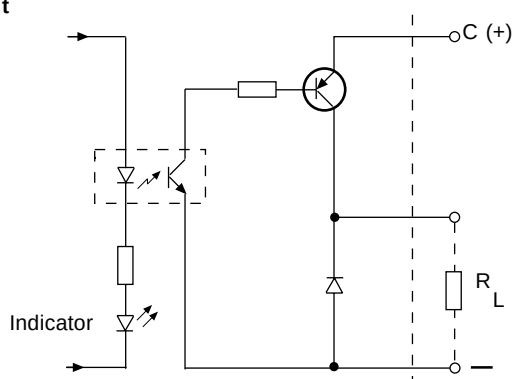


CIRCUIT CONFIGURATION (DIGITAL)

Input



Output



PROTOTCOL/DATA BASE INTERFACE

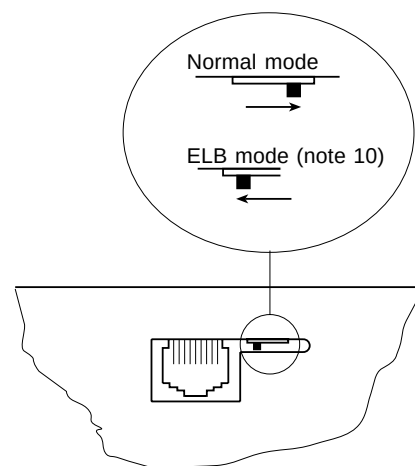
DI	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0
DI n	16 Inputs															
n+1																
n+2																
AI	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0
AI n					Channel 0 (0 - 4095)											
n+1					Channel 1 (0 - 4095)											
n+2					Channel 2 (0 - 4095)											
n+3					Channel 3 (0 - 4095)											
n+4					Counter 0 (0 - 4095)											
n+5					Counter 1 (0 - 4095)											
n+6					Counter 2 (0 - 4095)											
n+7					Counter 3 (0 - 4095)											
n+8																
n+9																
AI	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0
DO n	Not used								8 Outputs							
n+1																
n+2																

INPUT TABLE ANALOG INPUTS

Integer (binary value) = $\frac{\text{Input} - \text{range MIN.}}{R}$
where R is the resolution (LSB).

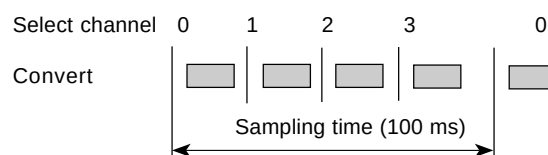
Input range				Integer (Binary- code)
0-10V	0-5V	0-20mA	4-20mA	
Input [V]		Input [mA]		
<0	<0	<0	<4.0	0
0	0	0	4.0	0
1	0.5	2	5.6	410
2	1.0	4	7.2	819
3	1.5	6	8.8	1229
4	2.0	8	10.4	1638
5	2.5	10	12.0	2048
6	3.0	12	13.6	2457
7	3.5	14	15.2	2867
8	4.0	16	16.8	3276
9	4.5	18	18.4	3686
10	5.0	20	20.0	4095
>10	>5.0	>20	>20.0	4095
2.442mV	1.221mV	4.884uA	3.907uA	Resolution

LOCAL BUS MODE SWITCH



NOTES/REMARKS

- Section A, B, C and D are isolated from each other. The individual analog inputs are isolated from each other. Due to protection devices at the analog inputs the voltage measured from the common (C) terminals to any other terminals must not exceed $\pm 80V$.
- The polarity at the input must be positive. The common terminal must be connected to negative.
- Input signals exceeding the maximum values **MAY CAUSE PERMANENT DAMAGE** to the module.
- External resistor (500 Ohm) to be mounted for 0-20mA input.
- Only one input channel is active at a time, the multiplexing is automatically performed by the built-in micro controller.



The value in the data base is represented by an integer (binary number) from 0 to 4095 depending on the input signal, see table below.

- Depending on the noise level versus signal level, shielded cables and/or twisted pairs might be necessary. The shield of the cable should normally be connected to common (C) of the Serie 2000 modules.
- Spare terminals may be used as supply rail for the sensors delivering the input signals.
- Excluding load on 24V loop supply. The additional current consumption can be calculated the approximate formula below:
- The pulsed inputs are applied to 4 summarizing counters. When reading one maximum value the counters returns to zero.
- ELB mode can normally be disregarded. It can only be used with products specified to support this mode.

DESCRIPTION

I/O Expansion module with 8 galvanic isolated outputs for traffic light control.

The outputs is equipped with current sensors for detecting high or low current. The limit alarms are reported as digital inputs in the I/O database. Limits are fixed values for both low and high alarms. If required the limits can also be controlled via the B-CONW program of the used Slave module

The switching output module is in general for 3 kind of incandescent lamps:

- 230 VAC
- 42VAC
- 10-15VAC

The outputs is galvanic isolationed 3,75kV from electronics, and 500V output to output.

The UCL-8LCO is delivered as an I/O expansion module in a 180 mm compact housing for DIN rail mounting. Other expansion modules can be attached via the second Local Bus connector if required to enlarge number of I/O.

VERSIONS/ORDERING CODES

Type:

I/O Expansion module

Input/output:

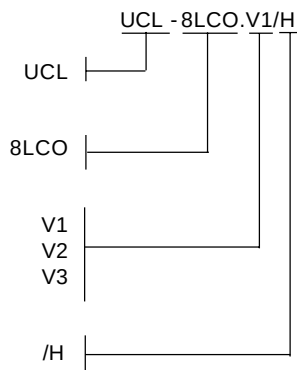
8 Output (16 alarm DI)

Rated switching voltage

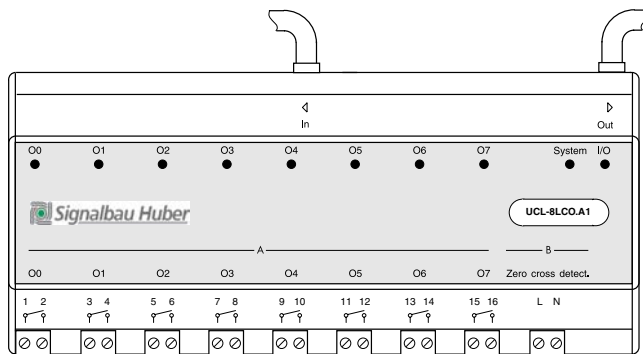
10-15 VAC
42 VAC
230 VAC

Brand

S & H



UCL-8LCO.VX/H



TECHNICAL DESCRIPTION

General

Control of the light is done via an output. The output can be either 100% active (constant ON) or 0% active (constant OFF), including flashing up to 2Hz.

In general 3 kind of incandescent lamps is supported:

- 230 VAC 100W
- 42VAC 40-60 W
- 10-15VAC 50W

The module monitors the current for each lamp output to detect excessive currents or lamps failures. The high or low current limit is defined for each lamp type. The alarm levels is fixed but are configureable in the factory. All outputs on one module shares the same alarm level set.

A time delay, for the alarms on each output, is also provided. Again, the time delay is in general fixed, but changeable in the factory (range: 1 to 10s). All High and Low alarms have the same time delays.

The current alarms is reported as virtual digital inputs in the module database. 2 byte for all lamp outputs, one byte input is reserved for alarm status (ON or OFF) while the other byte input report the alarm level (high or low).

Optional light dimming is expected to be carried out external to this module and will not affect the behavior or settings of the module. The normal current at the lowest dimming level must be well above the Low Current Alarm Level.

Functional description

The UCL-08LCO is designed as a compact expansion module for use in Light Control systems.

It receives digital output information on 8 lamp outputs and transmits digital alarm information over the local bus. The physical outputs are, except for small process delays, a one-to-one mirror of the digital output data. The physical output currents are monitored to detect external failures as short circuits or broken lamps, as well as internal failures in the output switches.

To prevent alarms from the high inrush current of the lamps, a time delay is defined after lamp is turn on. If the output after this delay, draws too much - or too little current an alarm will be reported. This delay is typical 1 – 3 seconds.

When the lamp is turned off, a delay is inserted after which the output current should be zero - typical 200 milliseconds.

To minimize EMI, the module is provided with a voltage synchronization input. Outputs will be switched ON and OFF in the voltage zero crossing phase, thereby reducing the switched voltage and current. This will also reduce the stress on the switching components and improve reliability.

To each output there is a yellow Light Emitting Diode, LED. The LED can be in 3 states: OFF, ON or Flashing.

OFF and ON relates to the normal conditions of the output, while the LED will be flashing if there is an alarm on the output. The module is provided with two green LEDs. The System I/O indicates the activity on the local bus.

The module will come in three variants - each designed to a specific output voltage level.

Light Control Module

AC switching output module, UCL-8LCO

Configuration

Configuration is done on module level in factory. The default alarm levels is defined as:

Low level alarm = $I_{nom} - 90\%$

High level alarm = $I_{nom} + 30\%$

Table 1 Default configuration settings

Type/power:	I_{nom} [A]	High Alarm $I_{nom} + 30\%$ [A]	Low Alarm $I_{nom} - 90\%$ [A]	Alarm delay [Sec.]
230V/30W	0,13		0,013	1,0
230V/100 W	0,43	0,56		1,0
42V/40W	0,95		0,10	1,0
42V/60W	1,43	1,85		1,0
15V/50W	3,33		0,33	1,0
10V/50W	5,00	6,5		1,0

Alarm limit for one of three types switching voltages can in factory be adjusted for each type but not for each output.

The lamp type and alarm limit information is located in Non Volatile Memory board and is programmed in factory during calibration. The calibration procedure ensure that every output current measurement is calibrated and adjusted separately.

IO DATABASE (DIGITAL)

Type ID

When scanning the Slave to which the UCL-8LCO module is connected it will respond with 2 bytes:

- 16 DI identification: UCL-16DI.xx
- 8 DO identification: UCL-8DO.xx

If AI visible:

- 16DI identification: UCL-16DI.xx
- 8AI identification: UCL-8AI.xx
- 8DO identification: UCL-8DO.xx

Data IO scan.

The 8 digital outputs reported (1 byte) in the Slave database define the physical outputs:

Lamp Outputs: DO 0..7

Logical "1" equals "light ON".

The inputs (2 bytes) are virtual inputs used for alarm status and alarm level:

Alarm Status: DI 0..7 (OFF = no alarm, ON = alarm)

Alarm Level/type: DI 8..15 (OFF = low alarm, ON = high alarm)

IO DATABASE (VIRTUAL ANALOGUE)

Virtual analogue inputs

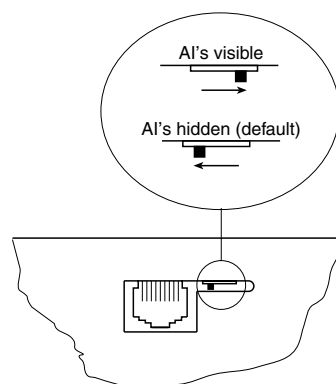
When scanning the Slave to which the UCL-8LCO module is connected it can also respond with 8 words virtual analogue input words which is the internal current measurement levels. The analogue values are reported as 12-bit values (0-4095 integers).

The virtual analogue inputs is only used in an Slave application program in case the predefined limits are not acceptable. Use of these unfiltered value will require average calculations and timer functions in your application program.

The virtual analogue inputs can be hidden and not be reported on the local bus. And they will then not be found in the Slave module database.

Use the switch near the local bus connector to hide the AI's. Default the AI's is not hidden.

Switch for hiding AI's in database:



TECHNICAL DATA

DIGITAL INPUTS

Only virtual inputs exists. They are internally connected to alarms from the current measuring circuits.

Alarm limits

Alarm levels is selected according to specification.

Factory default settings:

No alarm : $I_{nom} - 50\% < I < I_{nom} + 20\%$

Low alarm: $I < I_{nom} - 90\%$

High alarm: $I > I_{nom} + 30\%$

DIGITAL OUTPUTS (PORT A)

3 AC type output configuration is available; one for each voltage.

Only resistive loads, like incandescent lamps are allowed. DC voltage operated lamps are **not** allowed.

Ratings:

	Vmax [VAC]	Max Power *)	I_{Max} [A]	I_{Leak} [μA]	R_{ON} [Ohm]
Type V3: 230V/100W	275	130W	0.17	100	3
Type V2: 42V/40-60W	75	80W	1.9	100	0.160
Type V1: 10-15V/50 W	35	70W	6.5	100	0.060

*) at $T_{amb} = 55^\circ\text{C}$, derate to 75% at $T_{amb} = 65^\circ\text{C}$

Isolation: Output – Output: 500 V
Output – Electronics : 3.75 kV

Protection: Internal fuses are provided in sockets.
Replaceable by removing the top cover. The fuses are Littlefuse shortleg type similar to type no. 663.250HXSL

Switching freq.:
Max. 2Hz.

Output delay:
 $T_{OFF - ON}$ 2 – 25 ms
 $T_{ON - OFF}$ 2 – 25 ms

Output control:

Zero-crossing output control is available. Zero crossing control is enabled whenever an AC voltage is connected to the AC sync. input. The AC voltage must have the same frequency, phase and level as the lamp voltage.

VOLTAGE SYNC. INPUT (PORT B)

Input Voltage: Max. 275 VAC

The AC voltage must have the same frequency, phase and level as the lamp voltage.

Input Load: Typical : 1 W

GENERAL

Indicators: One for each digital output (yellow):
LED off - output not active
LED on - output active and current within the limits
LED flashing - output active and high or low alarm.

Two green LEDs indicating module status:
System LED on - Module OK
I/O LED on - local bus OK

Current

consumption: 140mA (at 12V DC) supplied by slave via local bus cable.

Ambient temp:

-10 - +55°C.
-20 - +65°C at 50% derating of current load.

EMC: EN 50081-1/EN50082-2.

Climatic:

Dry heat: IEC 68-2-2, Test Bd, Temp. +55°C, Duration 8h.
Cold: IEC 68-2-1, Test Ad, Temp. -10°C, Duration 8h.
Damp heat: IEC 68-2-3, Test Ca, Temp. 40°C, RH 95%, Duration 8h.

Mechanical:

Vibration: IEC 68-2-6, TestFc (sinusoidal), Freq.10-150 Hz, Amp. 4g, 5 sweeps in 3 orthogonal axes.
Shock: IEC 68-2-27 (half sine), Acc. 15g, Pulse time 11msec., 3 x 6 shocks.

Protection: IP20.

Mounting: 35 mm DIN-rail, EN50022.

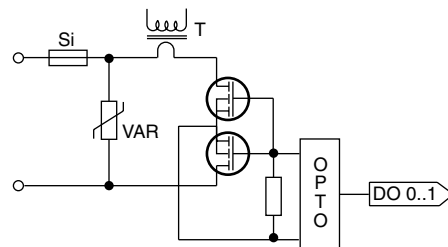
Terminals: Max. 1.5 mm² wire.

Housing: Anodized aluminium with plastic ends.
According to DIN 43880.

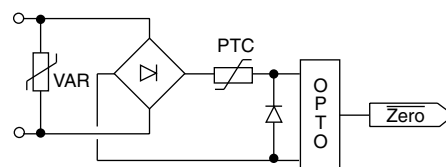
Dimensions: HxWxD: 80 (+ connectors) x180 x 62 mm.

CIRCUIT CONFIGURATION

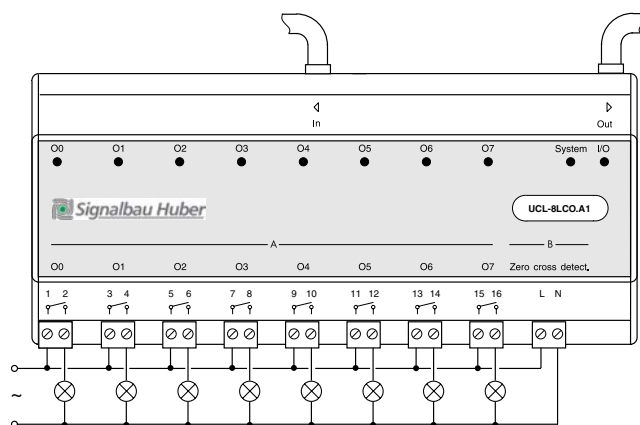
Output



Sync. input



WIRING DIAGRAM



Wiring notes:

It is recommended to connect the used phase and neutral to the port B, in order to have zero cross detecting. Using the zero cross detection will lower the switching emission.

Use ferrules on your wires to achieve best possible connection in the screw terminals.

Be careful when plugging in and out the terminals. If wrong aligned at plugging in the connector, the quality of the electrical connection can be reduced.

Remember to cover the un-used local bus connector on the last connected expansion module. A label for covering the connector is supplied with the Bitbus or Telemetry Slave used.

Local bus cable UCC-505 is used to connect to the Slave.

DESCRIPTION

Local expansion module with 16 32 bit (2 x 16 bit words) counters. For each counter a RESET function is provided. All inputs simultaneously function as ordinary inputs, reporting the immediate status. If less than 16 counters are required the unused inputs could be used as ordinary digital inputs (as in UCB - 16 DI). Normal expansion modules may be connected after this expansion module if required.

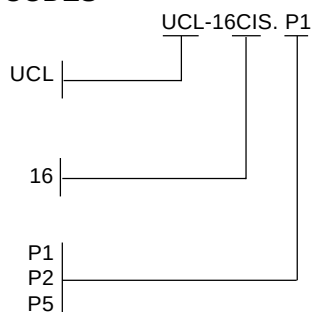
VERSIONS/ORDERING CODES

Type:

I/O Expansion module:

Counter input:
Number of inputs
16

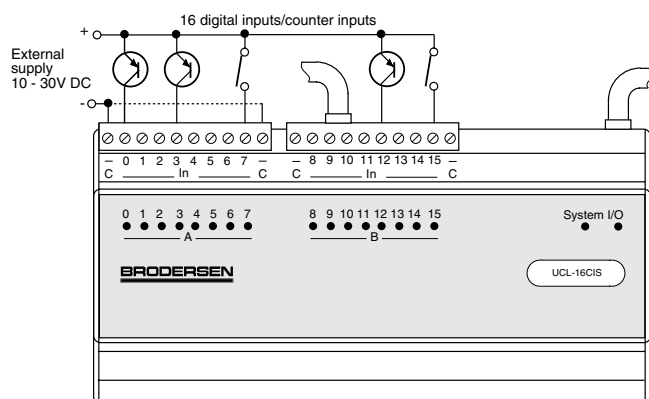
Input voltage range
10 - 30V DC uni polar
30-60V DC uni polar
48-72V DC bi polar



NOTES/REMARKS

- 1) If only 16 bit counter capacity is required (max. 65535) the most significant word may be disregarded.
- 2) An active bit clears the corresponding counter. The counter is kept cleared until bit becomes inactive, however max. 5 sec.
- 3) There is no battery back-up for counter values. Counter data will be lost at power off.

WIRING DIAGRAM



PROTOCOL/DATABASE INTERFACE

I/O type	Words	IO assignment) (B-CONW	Description
DI	1	DI0	Read input status
CI0	2	DI1 (LSB) DI2 (MSB)	First counter
CI1	2	DI3 (LSB) DI4 (MSB)	Second counter
CI2	2	DI5 (LSB) DI6 (MSB)	
CI3	2	DI7 (LSB) DI8 (MSB)	
.	.	.	
CI14	2	DI29 (LSB) DI30 (MSB)	Last counter
CI15	2	DI31 (LSB) DI32 (MSB)	
DO	1	DO0	Reset counter, note 2
Total	34		

Digital input/output

Counter input, UCL - 16 CIS.Px

TECHNICAL DATA

Input delay:	Typical 2ms
Active input voltage:	P1: 10-30V DC/uni polar P2: 30-60V DC/uni polar P5: 48-72V DC/bi polar
Inactive input voltage:	0V to +3V DC
Input current:	P1: Typical: 3mA@12V DC 5mA@24V DC P2: Typical: 3mA@30V DC 5mA@60V DC P5: Typical: 3mA@48V DC 5mA@72V DC
Max. counting frequency:	80Hz (6ms pulse/6ms pause)
Counter range:	32 bit (4.294.967.296)
Indicators:	
Digital input:	One for each digital input (red) indicating active input.
System:	Indicating RTU OK (green)
I/O:	Indicating I/O and local bus OK (green)

GENERAL

Current consumption (12V) note 14:	
UCR-16DIO:	max. 105 mA.
UCR-32DI:	max. 90 mA.
UCR-28IO:	max. 100 mA.
Isolation:	IEC class II, 3,75 kV. (mains supply versions) Safety earth required.
Ambient temperature:	-10 - +55°C.
EMC:	EN 50081-1/EN50082-2.
Climatic:	
Dry heat:	IEC 68-2-2, Test Bd, Temp. +55°C, Duration 8h.
Cold:	IEC 68-2-1, Test Ad, Temp. -10°C, Duration 8h.
Damp heat:	IEC 68-2-3, Test Ca, Temp. 40°C, RH 95%, Duration 8h.
Mechanical:	
Vibration:	IEC 68-2-6, Test Fc (sinusoidal), Freq. 10-150Hz, Amp. 4g, 5 sweeps in 3 orthogonal axes.
Shock:	IEC 68-2-27 (half sine), Acc. 15g, Pulse time 11msec., 3 x 6 shocks.
Protection:	IP20.
Mounting:	35 mm DIN-rail, EN50022.
Terminals:	Max. 1.5 mm ² wire.

Housing: Anodized aluminium with plastic ends.
According to DIN 43880.

Dimensions:
HxWxD: 80(+connectors)x108/162x62 mm.