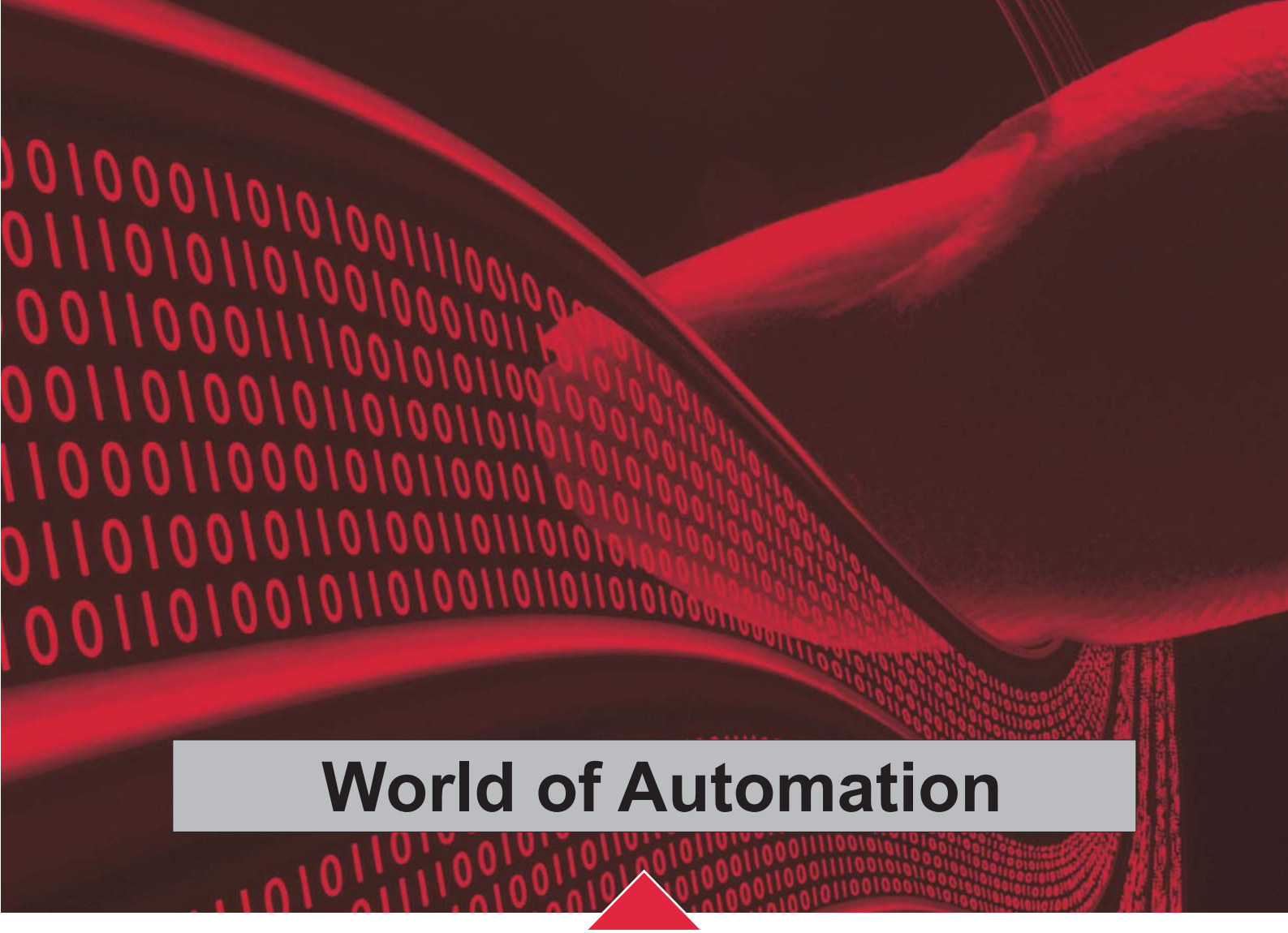


World of Automation

Chapter 4: Signal converting relays

HIQUEL®
HIGH QUALITY ELECTRONICS

www.hiquel.com

Index

4 Chapter 4: signal converting relays

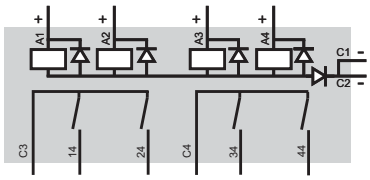
HIQUEL® HIGH QUALITY ELECTRONICS

K4S/K2W

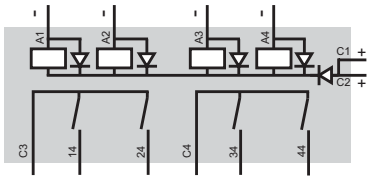
overview

- **PLC transistor output to power switching converter**
- **relay output max. 6A**
- **coil voltage 24V= or 12V=**
- **common positive or negative**
- **LED indicators for output relays**
- **22.5mm DIN rail mount housing**

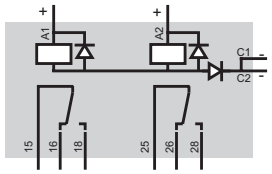
K4S-24P, K4S-12P



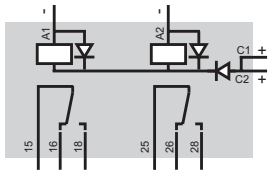
K4S-24N, K4S-12N



K2W-24P, K2W-12P



K2W-24N, K2W-12N



specification

coil voltage		nominal voltage +10% / -15%
duty cycle		100%
output relay specification		max. 6A 230V~
relay type		1
le AC-15*	120V~	5A
le AC-15*	240V~	4A
le DC-13*	24V=	4A
expected life time		DPCO SPCO
mechanical		2 x 10^6 resp. 1 x 10^7 operations
electrical		1 x 10^5 resp. 1 x 10^5 operations
screws		pozidrive 1
screw tightening torque		0,6..0,8Nm
operating conditions		-20 to +60°C non condensing

* EN 60947-5-1 VDE 0435

ordering information

part no	supply		output	relay type	cULus	housing type
K4S-24P	24V=	360mW	4 x SPNO	1	-	B
K4S-24N	24V=	360mW	4 x SPNO	1	-	B
K4S-12P	12V=	360mW	4 x SPNO	1	-	B
K4S-12N	12V=	360mW	4 x SPNO	1	-	B
K2W-24P	24V=	360mW	2 x SPCO	1	-	B
K2W-24N	24V=	360mW	2 x SPCO	1	-	B
K2W-12P	12V=	360mW	2 x SPCO	1	-	B
K2W-12N	12V=	360mW	2 x SPCO	1	-	B

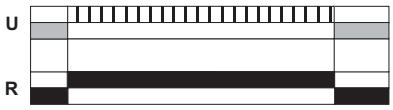
DMVR

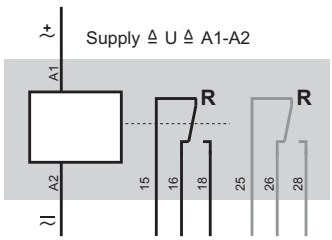
overview

- **multi-voltage relay**
- **SPCO or DPCO output max. 6A**
- **coil voltage 24-240V~=**
- **LED indicators for supply voltage and output relay**
- **22.5mm DIN rail mount housing**

PLC interface relay 24-240Vac/dc

Supply voltage on
Supply voltage off
Output relay contact closed
Output relay contact open





specification

coil voltage		nominal voltage +10% / -15%	
duty cycle		100%	
relay type		1	3
output relay spec	230V~	6A	10A
le AC-15*	120V~	4A	5A
le AC-15*	240V~	3A	4A
le DC-13*	24V=	2A	4A
expected life time		DPCO	SPCO
mechanical		2×10^6 resp.	1×10^7 operations
electrical		1×10^5 resp.	1×10^5 operations
screws		pozidrive 1	
screw tightening torque		0,6..0,8Nm	
operating conditions		-20 to +60°C non condensing	

* EN 60947-5-1 VDE 0435

ordering information

part no	supply		output	relay type	cULus	housing types
DMVR	24 - 240V~=	2VA	SPCO	3	-	A
DMVR2	24 - 240V~=	2VA	DPCO	1	-	B

other voltages on request

HIQUEL® HIGH QUALITY ELECTRONICS

K1S/K1W

overview

- **PLC transistor output to power switching converter**
- **relay output max. 10A SP relay 1.25A DP relay**
- **coil voltage 230V~ or 24V~=**
- **common positive or negative**
- **LED indicator for relay status**
- **11.25mm DIN rail mount housing**

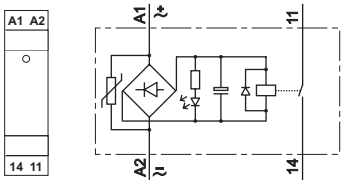
PLC interface relay in 11.25mm housing

1 or 2

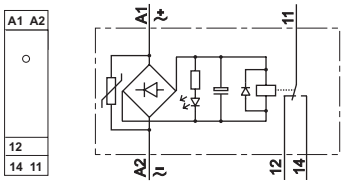
1

DIN

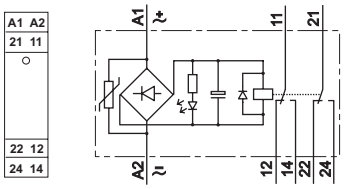
K1S



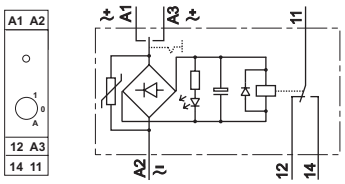
K1W



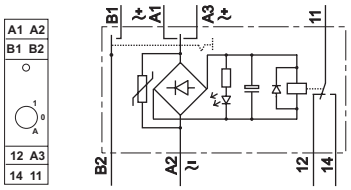
K2W



K1W-S



K1W-S-R



specification

coil voltage		nominal voltage +10% / -15%	
duty cycle		100%	
nominal current		15mA	
suppressor circuit		freewheeling diode and varistor	
relay type		1	2
output relay spec.	230V~	10A	2A
le AC-15*	120V~	1,5A	-
le AC-15*	240V~	1,5A	-
le DC-13*	24V=	1,5A	-
on delay		<8ms	<12ms
off delay		<25ms	<25ms
contact material		AgCdO	AgNi+Au (5μm)
switching voltage		250V~=	250V~=
input current		15A	2A
continuous current		10A	1,25A
min. switching capacity		>5mA	>1mA
max. switching frequency		600/h	360/h
mechanical		2×10^6	resp. 1×10^7 operations
electrical		1×10^5	resp. 1×10^5 operations
screw tightening torque		0,5Nm	
operating conditions		-20 to +60°C non condensing	

* EN 60947-5-1 VDE 0435

ordering information

part no	supply		output	relay type	cULus	housing type
K1S 24Vac/dc	24V~=	355mW	1 x SPNO	1	-	○
K1S 230Vac/dc	230V~=	< 1,2W	1 x SPNO	1	-	○
K1W 24Vac/dc	24V~=	355mW	SPCO	1	-	○
K1W 230Vac/dc	230V~=	< 1,2W	SPCO	1	-	○
K2W 24Vac/dc	24V~=	355mW	DPCO	2	-	○
K1W-S	24V~=	355mW	SPCO	1	-	○
K1W-S-R	24V~=	355mW	SPCO	1	-	○
					-	

other voltages on request

HIQUEL® HIGH QUALITY ELECTRONICS

SW1/SW2/SW3

overview

- **coil voltage 24V~=**
- **SPCO output max. 10A**
- **trigger input with 1/0/Auto switch**

SW1	**3,0V ON**	**2,5V OFF**
SW2	**7,0V ON**	**6,5V OFF**
SW3	**2,0V ON**	**1.5V OFF**

- **LED indicators for output**
- **11.25mm DIN rail mount housing**

SW1/SW2/SW3:

The SW triggers are designed to control pumps, fans, burners etc. They are also designed to operate with an analogue 0-10VDC control signal.

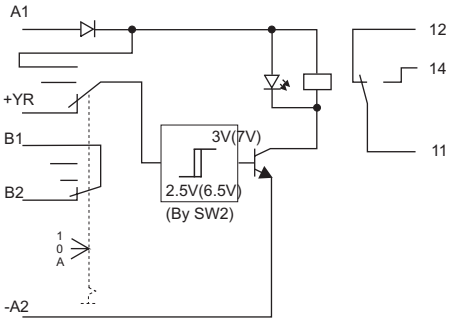
Trigger Function
As soon as the input voltage reaches the operating threshold (ON), in AUTO Mode, the relay pulls in.
If the input voltage falls below the cut off threshold (OFF), the relay drops out again.
A manual control facility with feedback contact, (mode 1) is incorporated for manual operation

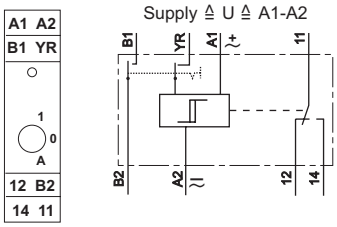
The module can be operated in two modes which can be selected by the three-position switch (Auto, 0, 1).

1. Switch position “1”: The output relay is controlled via terminals A1, A2

2. Switch position “Auto”: The output relay is controlled by the trigger through terminals YR. The operating voltage must be available continuously at terminal A1.

3. Switch position “0”: The relay is switched off. Input signals at terminals A1 or YR are ineffective.





specification

coil voltage		nominal voltage +10% / -15%
duty cycle		100%
nominal current		15mA
suppressor circuit		freewheeling diode and varistor
relay type		1
output relay spec	230V~	10A
Ie AC-15*	120V~	5A
Ie AC-15*	240V~	4A
Ie DC-13*	24V=	4A
on delay		<8ms
off delay		<25ms
contact material		AgCdO
switching voltage		250V~
input current		16A
continuous current		10A
min. switching capacity		5mA
max. switching frequency		600/h
mechanical		2×10^6 resp. 1×10^7 operations
electrical		1×10^5 resp. 1×10^5 operations
screw tightening torque		0,5Nm
operating conditions		-20 to +60 °C non condensing

* EN 60947-5-1 VDE 0435

ordering information

part no	supply		output	relay type	cULus	housing types
SW1 24Vac/dc	24V~=	600mW	SPCO	1	-	O
SW2 24Vac/dc	24V~=	600mW	SPCO	1	-	O
SW3 24Vac/dc	24V~=	600mW	SPCO	1	-	O

HIQUEL® HIGH QUALITY ELECTRONICS

ANU/ANI

overview

- **supply voltage 24V~=**
- **feedback contact for manual or automatic mode**
- **protection against incorrect connection**
- **short circuit protection**
- **LED indicator proportional to output level**
- **22.5mm DIN rail mount housing**

Description:

ANU/ANI are used with automatic control systems (BMS, PLC, PC) that provide a 0-10V or 0-20mA signal for controlling variables such as temperature, speed, position etc.

In automatic mode ("Auto") the analogue signal from the control system (terminals YR & ⊥) is re-transmitted to the controlled device (ratio 1:1).

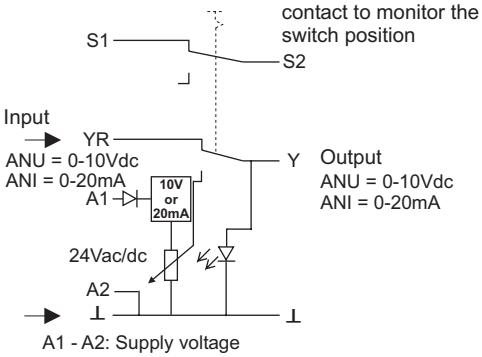
In manual mode ("Manu") the analogue signal from the control system is isolated and the ANU/ANI inject a signal (terminals Y & ⊥) which can be adjusted from 0 to 10V or 0-20mA by the potentiometer.

The switch position (mode) can be monitored externally on terminals S1 - S2 (feed-back contact).

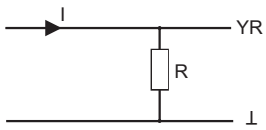
The brightness of the LED "Y" is proportional to the output signal level.

The output is short circuit protected.

ANU



A1 - A2: Supply voltage



Application with ANU: Input 0-20mA; Output 0-10Vdc

Current input with external resistor is possible.
z.B.: 0-20mA and R = 500 Ohm
terminal YR to terminal ⊥= 0 - 10V

specification

supply voltage variation	nominal voltage +20% / -15%
frequency range	48 - 63 Hz
duty cycle	100%
nominal current	24V~/35mA 24V=/11mA
contact material	silver alloy
switch	S1-S2 28V~=/2A
current consumption	max. Y_R 10V_{DC} 2mA
screws	pozidrive 1
screw tightening torque	0,6..0,8Nm
operating conditions	-20 to +60°C non condensing

ordering information

part no	supply	output	relay type	cULus	housing type
ANU	24V~= < 1VA	0-10V=	-	-	B
ANI	24V~= < 1VA	0-20mA=	-	-	B

LSM

overview

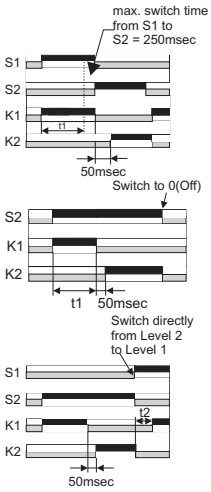
- **power supply 230V~**
- **2 adjustable timers**
- **2 relay outputs 230V~**
- **LED indicators for level 1+2**
- **22.5mm DIN rail mount housing**

Description:

The LSM was designed specifically to control two-speed fan motors. The LSM is controlled by a two-position switch, which is connected directly to the LSM (S1, S2). The motor contactors are controlled by the two outputs (K1, K2).

The LSM will automatically control the speed selection so that the operator cannot switch the fan on from stand-still to high speed, or off when running in high speed.

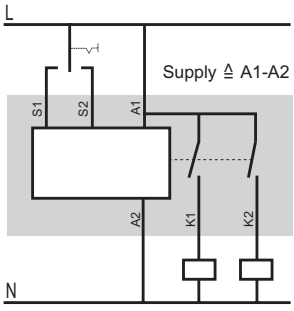
The 3 functions are:

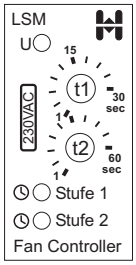


1.) In switch position 1 the motor will run in low speed during the set time t1. After the time t1 has expired it is possible to switch over to position 2 for high speed.
The switch over time is max. 250 msec. If this is exceeded the LSM goes to function 2.

2.) If switch position 2 (high speed) is selected before switch position 1, the motor will be forced to run for the time t1(low speed).
After t1 there will be an interval of 50 msec before the motor goes into high speed.

3.) Once in high speed, if the input is switched from position 2 to position 1 Or 0 (=stop), the high speed contact will switch off and the motor will be free wheel for the duration of timer t2 after which the low speed contact will switch on if the switch is in position 1, or will coast to a stop if switch position 0 is selected.





specification

supply voltage varation		nominal voltage +10% / -15%
frequency range		48-63Hz
duty cycle		100%
repeat accuracy		<1% of the selected range
output relay specification		max. 6A 230V~
relay type		1
le AC-15*	120V~	5A
le AC-15*	240V~	4A
le DC-13*	24V=	4A
expected life time		DPCO SPCO
mechanical		2 x 10^6 resp. 1 x 10^7 operations
electrical		1 x 10^5 resp. 1 x 10^5 operations
screws		pozidrive 1
screw tightening torque		0,6..0,8Nm
operating conditions		-20 to +60 °C non condensing

* EN 60947-5-1 VDE 0435

ordering information

part no	supply	output	relay type	cULus	housing types
LSM 230Vac	230V~ 8VA	2 x SPNO	1	-	A
				-	

HIQUEL® HIGH QUALITY ELECTRONICS

MU-PT100/PT1000

overview

- **temperature to analogue signal transducer**
- **high linearity, long term stability, high accuracy**
- **4 selectable temperature ranges**
- **current and voltage outputs**
- **2, 3 or 4 wire PT sensor connections**
- **22.5 or 45mm DIN rail mount housing**

Description

The offset of the output signal is selected with the first DIP switch, the measurement range is selected with the other two DIP switches.

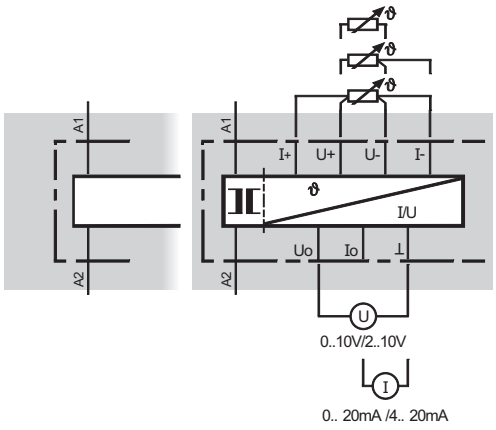
The different probe connection types are detected automatically.

The use of shielded and twisted-pair cable is recommended. Connect the shield of the cable (if used) to the connector "I-". "U+"/"U-" and "I+/"I-" are twisted together (if twisted cable used).

Do not lay the PT probe cable close to supply voltage cables.

specification

supply voltage variation	nominal voltage +10% / -10%
input	PT100/PT1000
connection	2, 3 or 4 wire
temperature ranges	-30°C to 100°C
	0°C to 100°C
	0°C to 200°C
	0°C to 300°C
current output	
accuracy	<0,1%
max. output load	550 Ohm
temperature coefficient	<0,01%/K
voltage output	
accuracy	<0,3%
max. output current	<5mA
temperature coefficient	<0,01%/K
screws	pozidrive 1
screw tightening torque	0,6..0,8Nm
operating conditions	-20 to +60°C non condensing



ordering information

part no	supply		sup. galv. iso.*	cULus	housing type
MU-PT100/24Vdc	24V=	1,5W	no	-	B
MU-PT100/24Vac	24V~	2,5VA	yes	-	B
MU-PT100/115Vac	115V~	2,5VA	yes	-	C
MU-PT100/230Vac	230V~	2,5VA	yes	-	C
MU-PT1000/24Vdc	24V=	1,5VA	no	-	B
MU-PT1000/24Vac	24V~	2,5VA	yes	-	B
MU-PT1000/115Vac	115V~	2,5VA	yes	-	C
MU-PT1000/230Vac	230V~	2,5VA	yes	-	C

* PT100/PT1000 and the output signals are galvanically isolated from the power supply

MU-TC

overview

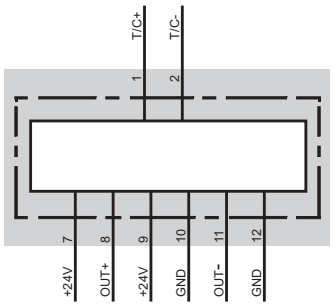
- thermocouple to analogue signal transducer
- supply voltage 24Vdc
- high linearity, long term stability
  high temperature stability
- selectable thermocouple input
- 23mm DIN rail mount housing

Description:

MU-TC uses microprocessor-controlled high resolution 16-bit dual-slope, integrating A/D converter to acquire a thermocouple signal and cold junction compensation input.

The configurable input offers a wide range of J, K, T, R, S, E, B type thermocouples and the output is linear to temperature. Therefore, stock investment for spare parts can be reduced and the highest system flexibility can be achieved.

Thermoelements			
Type	1	2	3
J	ON	ON	ON
K		ON	ON
T	ON		ON
R			ON
S	ON	ON	
E		ON	



specification

supply voltage	24V= ±10%	
power consumption	1.4W	
input	Type "J"	-40°C...760°C
	Type "K"	0°C...1000°C
	Type "T"	-100°C...400°C
	Type "E"	0°C...1000°C
	Type "S"	500°C...1750°C
	Type "R"	500°C...1750°C
	Type "B"	500°C...1800°C
output	0-10V	0.5 Ohm
temperature drift	±2°C	
isolation	1.000V=	
screw tightening torque	0,5Nm	
operating conditions	0 to +50°C non condesning	

ordering information

part no	supply	output	relay type	cULus	housing types
MU-TC	24V=	0-10V=	-	-	I
				-	

HIQUEL® HIGH QUALITY ELECTRONICS

MU-UI

overview

- **strain-gauge to analogue signal transducer**
- **supply voltage 24V=**
- **high linearity, long term stability**
- **high temperature stability**
- **selectable input and output signal**
- **23mm DIN rail mount housing**

Input Range (SW2)									
Bipolar	**Unipolar**	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**
+/-10mV	0~10mV	ON							
+/-50mV	0~50mV		ON						
+/-100mV	0~100mV			ON					
+/-0.5mV	0~0.5V				ON				
+/-1V	0~1V					ON			
+/-5V	0~5V								
+/-10V	0~10V								
+?-20mA	0~20mA								ON

Table 1: switch positions of input

Output Range (SW1)									
Output Range	**Input Range**	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**
-5V	-10mV, -50mV, -100mV, 0.5V, -1V, -5V, -20mA	ON		ON					ON
	0~10mV, 0~50mV, 0~100mV, 0~0.5V, 0~1V,	ON		ON		ON			ON
0~20mA	-10mV, -50mV, -100mV, 0.5V, -1V, -5V, -20mA		ON		ON			ON	
	0~10mV, 0~50mV, 0~100mV, 0~0.5V, 0~1V,		ON		ON				
	0~10V		ON		ON				ON
-10V	-10mV, -50mV, -100mV, 0.5V, -1V, -5V, -20mA	ON		ON					
	0~10V	ON		ON					ON
0~10V	-10mV, -50mV, -100mV, 0.5V, -1V, -5V, -20mA	ON		ON				ON	
	0~10mV, 0~50mV, 0~100mV, 0~0.5V, 0~1V,	ON		ON					
	0~10V	ON		ON					ON

Table 2: switch positions of output

Configuration

Figure 1 shows the terminal wiring of MU-UI. Positive power terminals 9 and 7 are internally connected, as are negative terminals 12 and 10. MU-UI uses single 24V=.
Tables 1 and 2 above show the switch positions to configure input and output range. The I/O configuration switches are located inside the module. To reach the switches, you need to remove the DIN-rail bracket by sliding it down.

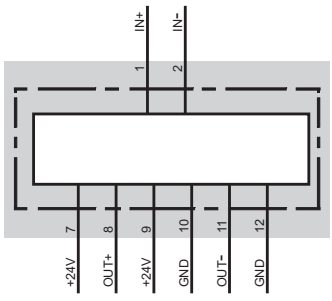


Figure 1. terminal wiring of MU-UI

Specification

supply voltage	24V= 10%
power consumption	0,85 Watt voltage output
	1,2 Watt current output
input	
Bipolar	+/-10mV, 0/-50mV, +/-100mV,
	+/-0,5V. +/-1V, +/-5V, +/-10V;
	+/-20mA
Unipolar	0-10mV, 0-50mV, 0-100mV,
	0-500mV, 0-1V, 5-5V, 0-10V;
	0-20mA
output	
Bipolar	+/-5V, +/-10V
Unipolar	0-10V
	0-20mA
accuracy	+/- 0,1% FSR (typ.)
temperature drift	150ppm typ
screw tightening torque	0,5Nm
operating conditions	0 to +50°C non condensing

ordering information

part no	supply	output	relay type		housing type
MU-UI	24V=	+/-5V, +/-10V, 0-10V, 0-20mA	-	-	I
				-	

transducer for strain gauge sensors

0-10V

4-20mA

DIN

HIQUEL® HIGH QUALITY ELECTRONICS

MU-DMS

overview

- **isolated strain-gauge to analogue signal transducer**
- **supply voltage 24V=**
- **high linearity, long term stability**
- **high temperature stability**
- **selectable output signal**
- **adjustment of user specified signals**
- **23mm DIN rail mount housing**

Input Range (SW2)					
Range	**1**	**2**	**3**	**4**	**5**
+/-10mV	ON				
+/-20mV		ON			
+/-30mV			ON		
+/-50mV				ON	
+/-100mV					ON

Table 1: switch positions of input

Output Range (SW1)								
Range	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**
+/- 5V	ON		ON					ON
+/- 10V	ON		ON					
0~10V	ON		ON				ON	
0~20mA		ON		ON			ON	

Table 2: switch positions of output

Configuration

Figure 1 shows the terminal wiring of MU-DMS. Positive power terminals 9 and 7 are internally connected, as are negative terminals 12 and 10. MU-DMS uses single 24V=.

Tables 1 and 2 above show the switch positions to configure input and output range. The I/O configuration switches are located inside the module. To reach the switches, you need to remove the DIN-rail bracket by sliding it down.

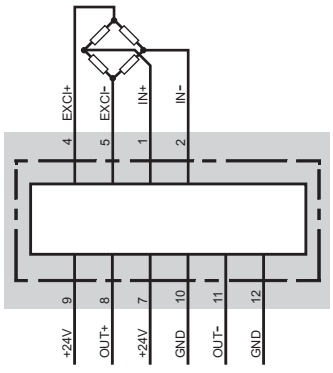


Figure 1. Terminal wiring of MU-DMS

specification

supply voltage	24V= ±10%
power consumption	1,85 Watt at voltage output
	2,15 Watt at current output
input	+/-10mV, +/-20mV, +/-30mV,
	+/-50mV, +/-100mV
	max. 60mA
output	
Bipolar	+/-5V, +/-10V
Unipolar	0-10V
	0-20mA 0-500Ohm (load.)
accuracy	+/- 0,1% FSR (typ.)
temperature drift	150ppm typ
screw tightening torque	0,5Nm
operating conditions	-10 to +70°C non condensing

ordering information

part no	supply	output	relay type	cULus	housing types
MU-DMS	24V= 2W	+/-5V, +/-10V, 0-10V, 0-20mA	-	-	I
				-	

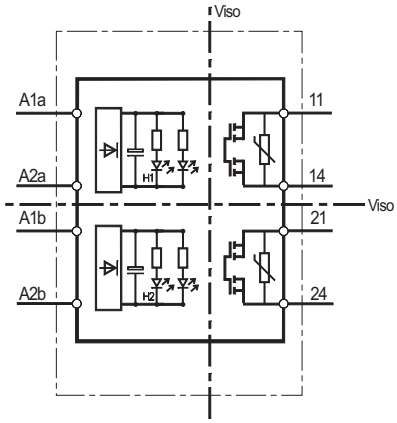
HIQUEL® HIGH QUALITY ELECTRONICS

K1T/K2T

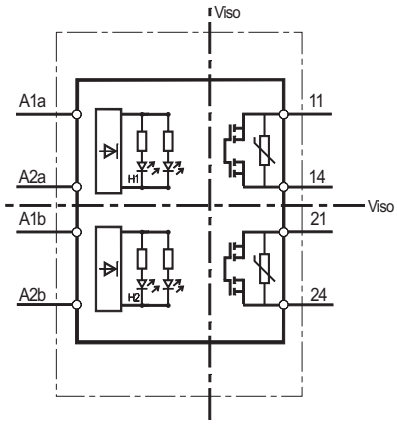
overview

- **interface relay with photomos output**
- **wide voltage range (different ranges)**
- **10kHz bandwidth**
- **LED indicators**
- **protected against incorrect polarity**
- **K1T - one line coupler**
  K2T - two line couplers
- **22.5mm DIN rail mount housing**

K2T xxac/dc



K2T xxdc



specification

supply voltage	nominal voltage ±10%
duty cycle	100%
protection circuit	VDR
voltage deviation	±20%
	(duration of deviation less
	than 5s,
	no output change)
turn-on time	
DC-version	<10µs
AC/DC-version	<20ms
turn-off time	
DC-version	<40µs
AC/DC-version	<40ms
isolation voltage	2,5kV
on-state voltage	<3V
output voltage range	24Vac/dc.. 230Vac/dc
max. load current	500mA ac/dc
output	photomos
screws	pozidrive 1
screw tightening torque	0,6..0,8Nm
operating conditions	-20 to +60°C no condensing

* EN 60947-5-1 VDE 0435

ordering information

part no	input	Ri*	Icont*	(Uout · Iout)max@f	f@max(Uout . Iout)	housing type
K1T 12Vdc..30Vdc	12V=..30V=	1,5kΩ	<8mA	(230V*500mA)@1Hz	10.000Hz@(230V*40mA)	B
K1T 12Vac/dc..30Vac/dc	12V~/=..30V~/=	1,5kΩ	<8mA	(230V*500mA)@1Hz	5Hz@(230V*100mA)	B
K1T 24Vac/dc..230Vac/dc	24V~/=..230~/=	6,0kΩ	<21mA	(230V*500mA)@1Hz	5Hz@(230V*100mA)	B
K2T 12Vdc..30Vdc	12V=..30V=	1,5kΩ	<8mA	(230V*500mA)@1Hz	10.000Hz@(230V*40mA)	B
K2T 12Vac/dc..30Vac/dc	12V~/=..30V~/=	1,5kΩ	<8mA	(230V*500mA)@1Hz	5Hz@(230V*100mA)	B
K2T 24Vac/dc..230Vac/dc	24V~/=..230V~/=	6,0kΩ	<21mA	(230V*500mA)@1Hz	5Hz@(230V*100mA)	B

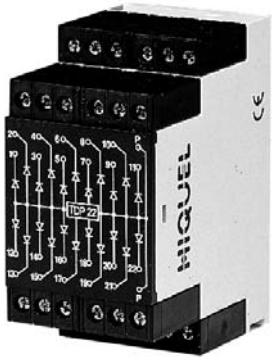
other voltage on request

* Ri = power-on input resistance
* Icont = current through input pin after 5 sec

HIQUEL® HIGH QUALITY ELECTRONICS

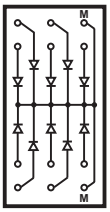
TV../TD..

overview

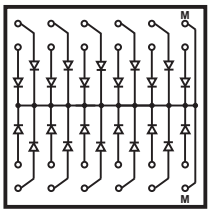


- multi way diode boxes
- common cathode for alarm integration
- common anode for lamp testing
- up to 34 1000v diodes in one housing
- 22.5/45/67.5mm DIN rail housing
  or 11pin plug in housing

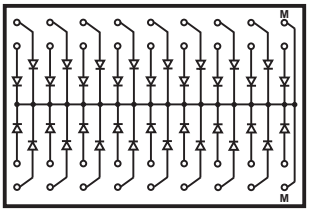
TDM 10



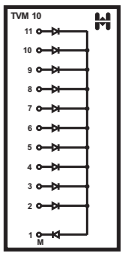
TDM 22



TDM 34

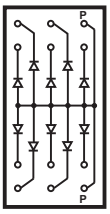


TVM 10

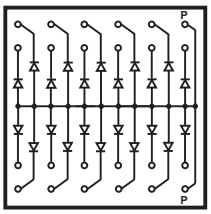


Multi-way diode box for the integration of multiple alarm circuits where any one of a number of alarm signals will activate an output.

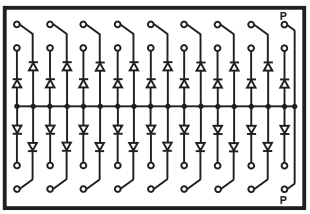
TDP 10



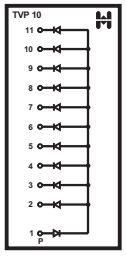
TDP 22



TDP 34



TVP 10



Multi-way diode box for lamp testing where one switch connected to the diode box input will test the continuity of lamp circuits.

specification

diode max current	1,0 A
diode max voltage	1000 V
diode voltage drop	0,7 V
screws	pozidrive 1
screw tightening torque	0,6..0,8Nm
operating conditions	-20 to +60°C non condensing

ordering information

part no	supply	output	relay type	cULus	housing type
TVM 10	10	1	-	-	G
TVP 10	1	10	-	-	G
TDM 10	10	2	-	-	B
TDP 10	2	10	-	-	B
TDM 22	22	2	-	-	D
TDP 22	2	22	-	-	D
TDM 34	34	2	-	-	F
TDP 34	2	34	-	-	F

HIQUEL® HIGH QUALITY ELECTRONICS