MAGTROL

Digital measuring Amplifier
Type MVD100

1. INTRODUCTION

The MVD 100 measuring Amplifier is designed to control forces, loads, pressures, etc. in connection with analog sensors, predominantly with DMA transmitters. After conditioning the actual value signal, the device is digitally assisted by a processor (MSP 430/TI). A total of 3 switching thresholds, which include hysteresis, switching performance, and pick-up delay, can be programmed and generated.

2. DESCRIPTION

Low drift precision operational amplifiers are used to amplify the sensor voltage to a level which can be processed by the processor's own A/D converter. The digitalized actual value is then compared with several set values. Switching signals are triggered if the actual value coincides with, or exceeds any of these set values. The relevant set values are entered via a keyboard with LCD display which can be plugged into the amplifier's PCB. This control unit may remain connected or be removed from the amplifier after programming since it does not affect the amplifier's function.

3. INPUT MODE

3.1 INPUT KEYS

The control unit is equipped with 1 switch and 3 keys which provide the following functions :

C1 switch		To switch from measuring mode to programming mode
K1 key		To advance parameter display
K2 key		Input of numerical values (set value, hysteresis, delay time)
K3 key		Transmission of input data to memory

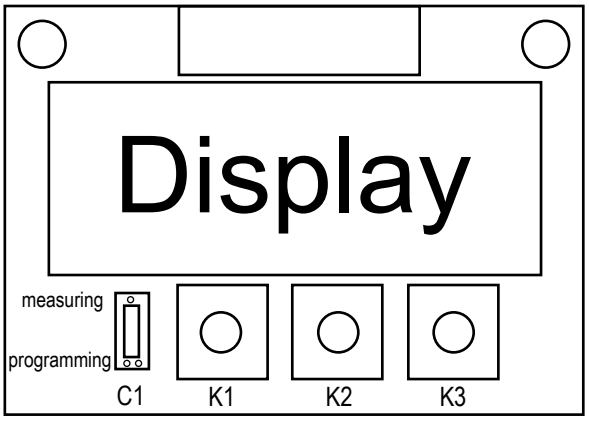


Figure 3.1 control unit

3.2 DISPLAY

An 8-digit one-line LCD display serves as the input control display. The display is active both in measuring and programing mode. The percentage load of the sensor is shown in the measuring mode.

3.3 INPUT PROCEDURE

1. Set the C1 switch to position 2 (programming mode). The following image will appear in the display: S1 xxx %

This means in normal language:
The set value of the first threshold (S1) amounts to XXX % at present. The cursor is at the lowest-order position, flashing.

2. Now the K2 key may be pressed in order to gradually increase the value displayed by +1 with every keystroke. The cursor jumps to the left by one digit position if the K2 key is depressed for two seconds or longer. Again press the K2 key in order to set the left digit to the desired value. Depress the K2 key for two seconds to return the cursor to the starting point.

3. Press the K3 key in order to transmit the numerical value entered to the parameter memory (EEPROM) where it will be stored in the event of a power failure.

4. The K1 key may be used in order to scroll to any parameter field.

3.4 PARAMETER LIST

Clocking sequence when pressing K3:

S1		Limit value 1 / set value (xxx %)
H1		Hysteresis for limit value 1 (xxx %)
T1		Pick-up delay of limit value 1 (xx.x sec)
I1		Switching point, normal (0) or inverse (1)
S2		Limit value 2 / set value (xxx %)
H2		Hysteresis for limit value 2 (xxx %)
T2		Pick-up delay of limit value 1 (xx.x sec)
I2		Switching point, normal (0) or inverse (1)
S3		Limit value 3 / set value (xxx %)
H3		Hysteresis for limit value 3 (xxx %)
T3		Pick-up delay of limit value 3 (xx.x sec)
I3		Switching point, normal (0) or inverse (1)
A		Adjusted zero point value
E		Adjusted end point value

Special feature:

If 000% is entered for S1 and/or S2 and/or S3, pressing the K3 transmission key will not result in the 000 value being transmitted to the memory, but instead the actual value put in from outside will be transmitted which has been converted by the AD converter. This is a self-learning function which can perform parameterisation directly with the maximum load applied.

3.4 START/END ADJUSTMENT

1. Press K1 in order to select parameter A (start adjustment).
2. Unload the sensor (scales).
3. Press the K3 transmission key.
4. Press K1 in order to select parameter E.
5. Apply a known force (weight) to the sensor.
6. Press the K3 transmission key.

ATTENTION: THE VALUE 100% IS AUTOMATICALLY ASSIGNED TO THE WEIGHT NOW STORED.

4. MEASURING MODE

Set C1 to the « Measuring Mode» position, then press the K1 key once. When in measuring mode the display consistently shows the percentage load on the load cell.

In measuring mode, the actual digital values determined are consistently compared with all 3 set values, and switching signals are triggered via the output relays in case of coincidence.

The hysteresis value is subtracted from the set value. The difference is the value at which the relay concerned releases.

Example:

S1 = 50.0%

H1 = 2.0%

S1-H1 = 48.0%

The relay switches are at 50% of full load when the measurement value is rising. When being unloaded, the relay switches off at 48% of full load.

The parameters T1, T2 and T3 constitute the turn-on delay times after which the relays are activated.

5. SERIAL INTERFACE

The serial interface (optional) of the processor (RS 232) allows to read out the actual data in the form 000% to 999% F.S. The end value is **not** identical to the load rating of the load cell, but instead is the weight value at which the system has been calibrated.

In addition, this interface provides the possibility to program the device via PC.

5.1 TRANSMISSION CONTROL PROTOCOL

Interface configuration: 9600, 8, n, 1 without handshake

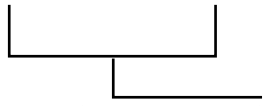
5.1.1. MEASURING DATA COLLECTION

HOST	DIRECTION	MVD100
enq (0x05)	→	
	←	STX (0x02)
	←	Sign ("+" or "-")
	←	10^2 sensor utilization [%]
	←	10^1 sensor utilization [%]
	←	10^0 sensor utilization [%]
	←	Separator " : "
	←	1st switching point ("0" or "1")
	←	2nd switching point ("0" or "1")
	←	3rd switching point ("0" or "1")
	←	Check number (MSB)
	←	Check number (LSB)
	←	ETB (0x17)

The check number is determined by adding the ASCII characters between STX and the two characters before ETB in byte mode without carry. This results in a 1-byte value xy. Two 1-byte numbers (x0, 0y) are determined on the basis of this value. x0 becomes 0x (push 4 times), and then becomes 3x through the addition of 30h. 30h is added to 0y in order to obtain 3y.

Example:

(STX)	*v*	*iii*	*t*	*sss*	*pp*	*(ETB)*
02h	*+*	*030*	*:*	*110*	*8:*	*17h*



Check number is calculated on the basis of these characters

Now the ASCII characters are added together.

+ = 2B

0 = 30

3 = 33

0 = 30

: = 3A

1 = 31

1 = 31

0 = 30

8A -> 8A => 80 -> 08 +30 -> 38 -> "8"

=> 0A +30 -> 3A -> ":"

Consequently, the check is "8:" (38Hex & 3AHex).

5.1.2. MEASURING DATA COLLECTION

HOST	DIRECTION	MVD100
	←	ENQ (0x05) (when entering programming mode)
	1 sec. delay at max.	
STX (0x02)	→	"REMOTE" shown in display
1st switching point (10^2)	→	
1st switching point (10^1)	→	
1st switching point (10^0)	→	
","	→	
Hysteresis 1 (10^2)	→	
Hysteresis 1 (10^1)	→	
Hysteresis 1 (10^0)	→	
","	→	
Delay time 1 (10^1)	→	
Delay time 1 (10^0)	→	
Delay time 1 (10^{-1})	→	
","	→	
Inversed 1 ("0" or "1")	→	
","	→	
2nd switching point (10^2)	→	
2nd switching point (10^1)	→	
2nd switching point (10^0)	→	
","	→	
Hysteresis 2 (10^2)	→	
Hysteresis 2 (10^1)	→	
Hysteresis 2 (10^0)	→	
","	→	
Delay time 2 (10^1)	→	
Delay time 2 (10^0)	→	
Delay time 2 (10^{-1})	→	
","	→	
Inversed 2 ("0" or "1")	→	
","	→	
3rd switching point (10^2)	→	
3rd switching point (10^1)	→	
3rd switching point (10^0)	→	
","	→	
Hysteresis 3 (10^2)	→	
Hysteresis 3 (10^1)	→	
Hysteresis 3 (10^0)	→	
","	→	
Delay time 3 (10^1)	→	
Delay time 3 (10^0)	→	
Delay time 3 (10^{-1})	→	
","	→	

Inversed 3 ("0" or "1")	→	
"."	→	
ETB (0x17)	→	

ATTENTION: THE VALUES FOR THE SWITCHING POINTS MUST BE > 0.

6. TYPE CODE

MVD 10 1 . 3 / 24V

① ② ③

① *Connection*	
1 = Plug-in card with 32-pin DIN strip	*3 = Version with 20-pin terminal strip*
2 = Version with 20-pin terminal strip	*8 = Plug-in card with 32-pin DIN strip incl. front panel*

② *Switching point*	
0 = Without switching points	*2 = Equipped with 2 switching points*
1 = Equipped with 1 switching point	*3 = Equipped with 3 switching points*

③ *Voltage supply:*
24 VDC
115 VAC
230 VAC

7. CONNECTION TO 230/115 VAC SUPPLY VOLTAGE

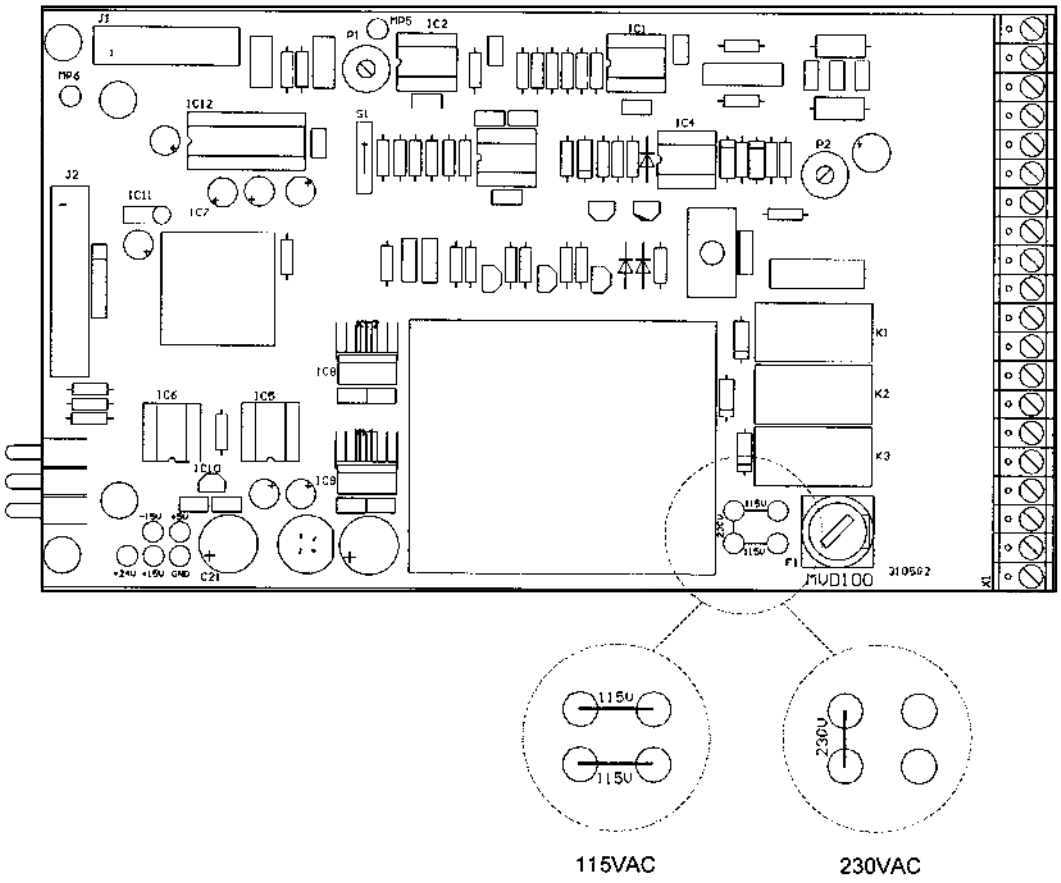


Figure 7.1 Jump wire connections for voltage supply

8. TERMINAL DIAGRAM

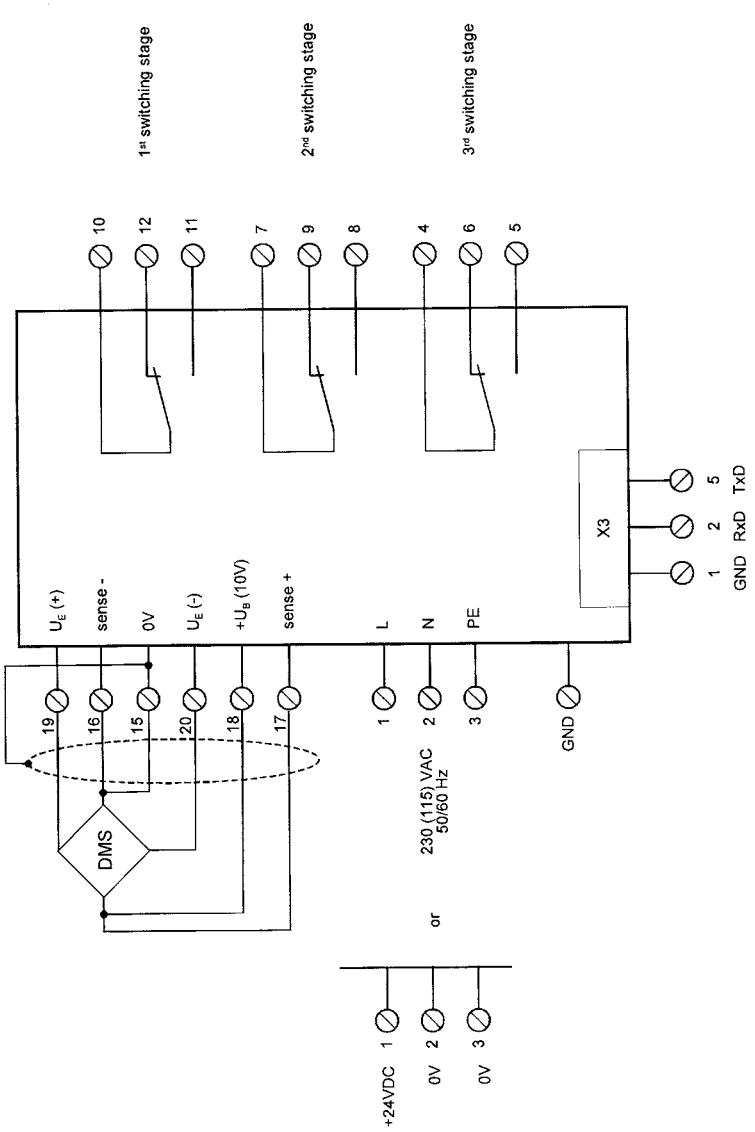


Figure 8.1 Terminal diagram

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