DIGEM f 144 x 72

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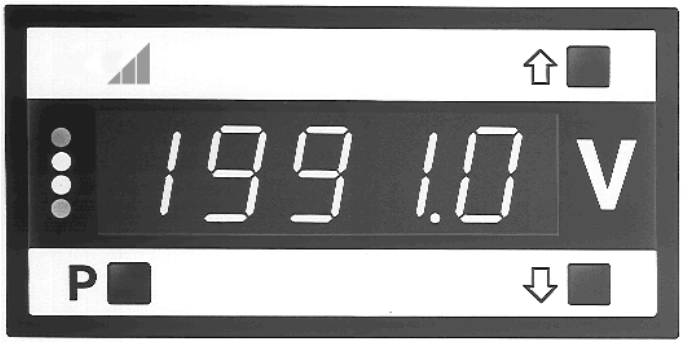
1/7.98

- Front panel dimensions: 144 x 72 mm
- Display range: ± 19 999 digits for current and voltage measurements
- Can be adapted to customer specific characteristic curves
- Modular connector system provides flexibility
- Calibration and special functions can be selected at keypad
- Electrically isolated measuring circuit power supply
- IP 54 protection at front panel
- Up to 4 limit values
- Suitable for panel mounting
- Red or green LED display, 20 mm high



Applications

The DIGEM f 144 x 72 is suited for applications which require more than 2 limit values, or where outputs and interfaces are used simultaneously.

The measuring input is of modular design and can be configured for any of the following measuring tasks:

- Measurement of direct current and direct voltage, 4 ½ place
- Measurement of alternating current and voltage, sinusoidal
- Measurement of alternating current and voltage, RMS
- Temperature measurement
- Frequency and R.P.M. measurement
- Pulse counter
- Display in cos φ
- Non-linear input quantities

Description

In its basic configuration, the DIGEM f 144 x 72 is a 4 ½ place, direct voltage voltmeter with extremely high resolution, high level accuracy and good temperature stability characteristics.

The measuring instrument is of modular design, and can be easily adapted to the measuring task at hand.

The integrated microcomputer allows for easy operation and a multitude of additional functions.

The following functions can be adjusted with the keys at the front panel:

- Zero shifting throughout the entire range
- Adjustment of the measuring span
- Adaptation of non-linear characteristic curves with 10 break points
- Additional tendency display
- Storage of minimum and maximum values
- Comparison of set-points and actual values, automatic taring
- Mean value generation with several measurements
- Rounding of the last digit

The MESSCONTACTER version allows for the setting of 4 limit values.

Alarm signals are read out at 4 relays, and alarms are indicated with LEDs as well.

The MESSCONTACTER also includes the following features:

- Adjustable switching hysteresis
- Adjustable time delay for limit values
- Storage of alarm messages

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All DIGEM f 144 x 72 instruments can also be expanded with a floating analog output, an RS 232 or an RS 485 serial interface and a BCD data output.

Function and Operating Principle

Programming

Factory programming for each measuring instrument depends upon the selected model. Subsequent reprogramming is possible, even after installation.

All programmed values remain in memory, even if mains failure occurs.

Function and Operating Principle

1. Calibration

Matching of the display range to the input quantity can be accomplished in two different ways:

a) Digital selection of an offset quantity and a scaling factor
b) By applying the lower and upper range values to the measuring input and directly adjusting the corresponding display. The display range can be conveniently matched to a non-linear input signal with the help of ten break points.

2. Storage of Min-Max Values for Instruments without Limit Values

The three different versions of this instrument are configured as follows:

a) MIN-MAX Memory
Display of current measurement value and storage of minimum and maximum values to memory
b) Maximum Value Display
Display of the maximum value and storage of the minimum value to memory
c) Minimum Value Display
Display of the minimum value and storage of the maximum value to memory

Stored values can be queried and displayed via the keypad.

3. Differential Measurement

Available in two different versions:

a) Actual value comparison with adjustable set-point.
One measured quantity (set-point) can be digitally adjusted and remains in memory.
The difference between the actual measurement value and the set-point is displayed.
b) Automatic Taring
An input quantity is measured and stored to memory by pressing the program key (tare value, e.g. offset quantity). This value is automatically subtracted from all subsequent measurements. The measuring instrument displays the difference between the measurement value and the tare value.

4. Rounding and Mean-Value Generation

If legibility of the display is impaired by continuously fluctuating input quantities, the last place of the measurement value can be rounded in steps of either 2, 5 or 10. Mean values can also be generated for 1 to 128 measurements.

5. Tendency Display

Two LEDs can be used to indicate rising or falling tendencies for gradually changing measurement values (e.g. temperature).

6. Switching Hysteresis and Low-Pass Function

Switching hysteresis can be adjusted for relay tripping limit-values in steps of 1 from ± 1 to ± 127 digits.

Alternatively, a low-pass function with an adjustable time constant from 1 to 120 s can be selected. The mean value resulting from the measurement values is calculated and compared with the limit value during the selected time constant.

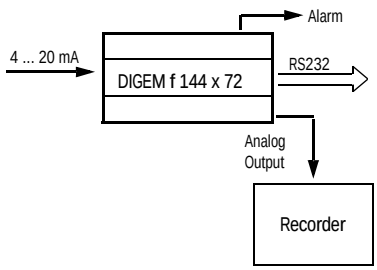
7. Limit Values

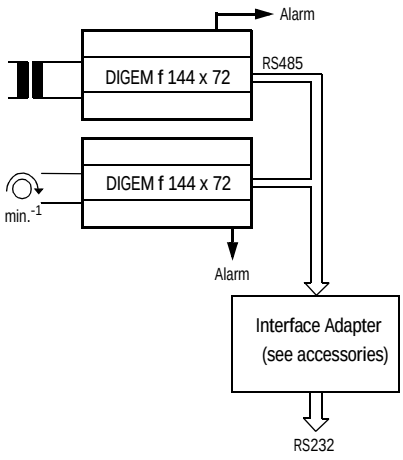
Each MESSCONTACTER is equipped with 4 limit values. Two of these are realized as main contacts, each of which consists of a relay with changeover contacts for alarm messages.
A preliminary contact is assigned to each main contact.
Each preliminary contact is provided with a relay, either normally closed or normally open, for alarm messages.

8. Generation and Storage of Alarm Messages

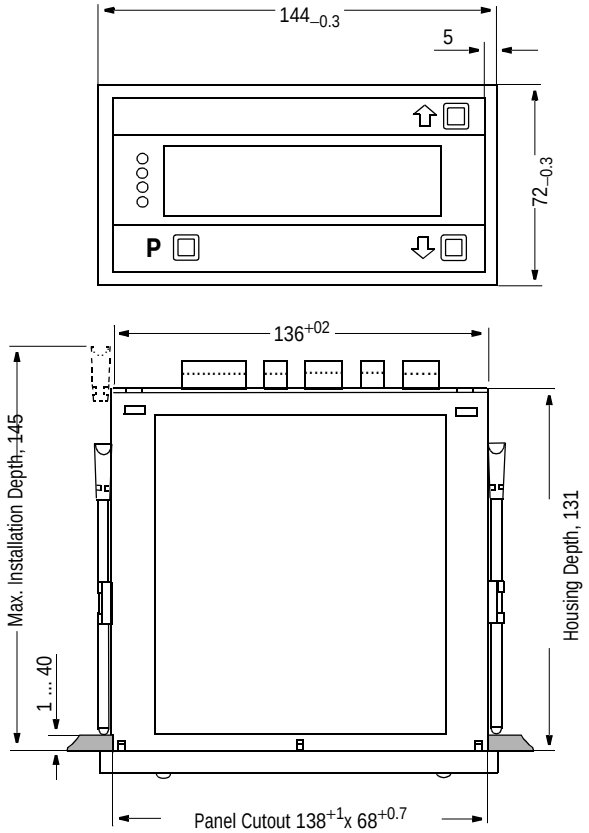
The MESSCONTACTER can be configured for either load current or closed-circuit current.
If the measurement value enters the alarm range, an alarm message is read out from the appropriate relay. All alarms are indicated unambiguously by means of LEDs as well.
If the measurement value drops back to below the alarm range, the alarm message is automatically cancelled.
This function can be overridden with the alarm memory if desired. In this case, the alarm message remains active even after the measurement value has fallen below the alarm range, until cancellation has been acknowledged by pressing keys a and e, or with an external signal applied at the hold input.

Applications

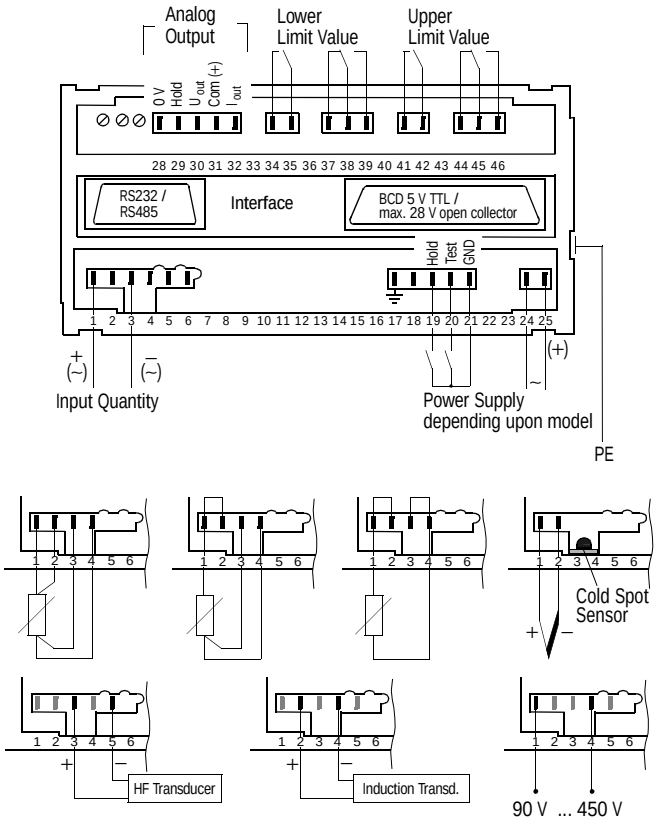




Dimensional Drawing



Terminal Assignments



Characteristic Values

Display	
Type	7 segment LED
Display Color	red / optional: green
Character Height	20 mm
Display Range	max. ± 19999
Polarity	"–" is displayed automatically
Decimal Point	programmable
Input	
1 measuring range depending upon measuring module	see Order Information / Article Number
Limit Values	
Direct Voltage and Direct Current Measuring Ranges:	± (0.05 % + 1 digit)
Temperature Coefficient	< 80 ppm / K
Series-Mode Rejection Ratio (SMRR)	> 35 dB at 50 Hz
Common-Mode Rejection Ratio (CMRR)	> 120 dB (with reference to 200 mV measuring range at 50 Hz)
Alternating Voltage and Alternating Current Measuring Ranges (sinusoidal):	
arith. 45 ... 65 Hz	± (0.2% + 3 digits)[1)]
30 Hz ... 1 kHz	additional ± (0.1% + 2 digits)[1)]
Temperature Coefficient	± (0.01% + 0.01 mV) / K[1)]
Alternating Voltage and Alternating Current Measuring Ranges (non-sinusoidal):	
RMS 45 ... 65 Hz	± (0.1% of reading + 0.1% of measuring range)[1)]
20 Hz ... 10 kHz	additional ± (0.1% of reading + 0.15% of measuring range)[1)]
Crest Factor	6 (additional 0.5%)[1)]
Temperature Coefficient	± (0.01% of rdg. + 0.01 mV)/K[1)]
Frequency and R.P.M. Measuring Ranges:	
a) 5.0 ... 100.0 ... 500.0 Hz	$\left(\frac{1}{T[ms]} - \left(\frac{1}{T[ms+0,01]}\right) x 1000\,Hz\right)$
Max. Resolution	0.1 Hz
Time Base	± 50 ppm
Temperature Coefficient	± 1.5 ppm / K
Display	$\frac{10 \times \text{frequencz (Hz)}}{\text{Scaling factor} + \text{Offset}}$ ± 1 Digit
b) 0 ... 2000.0 Hz	measurement duration: 10 s
Max. Resolution	0.1 Hz
0 ... 20.000 kHz	measurement duration: 1 s
Max. Resolution	1 Hz
0 ... 200.00 kHz	measurement duration: 0.2 s
Max. Resolution	10 Hz
Time Base	± 50 ppm
Temperature Coefficient	± 1.5 ppm / K
Display	frequency x scaling factor + offset

[1)] for modulation > 3% of measuring range upper limit

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Temperature Measuring Ranges:	
with PT100	resolution: ± 0.5°C at 0.1°C: resolution: ± 2°C at 1°C
Temperature Coefficient	< 150 ppm / K
Offset Drift	< 0.1 digits / K
with Thermocouples	± (0.2% + 2 digits)
Linearization Error	< 1 K
Temperature Coefficient	< 150 ppm / K
Offset Drift	< 0.1 digits / K
Cold Spot Compensation error (10 ... 50°C)	≤ 1 K
Resistance:	± (0.3% + 1 digit)
Pulse Counter:	0
Control Commands	
Storage of Display Value	externally controlled
Reset (blanking and segment test after release)	externally controlled
Outputs	
Relay Contacts for Meco	one changeover contact each for LOL1 and HIL one normally open contact each for LOL2 and HIL2
Switching Capacity	1 A~ / max. 260 V or 1 A– / max. 30 V
Switching Time	max. 400 ms
Switching Hysteresis	adjustable from ± 1 digit to ± 128 digits
Delay Time	adjustable from 1 s to 120 s
Analog Output (optional)	electrically isolated from measuring circuit, as indicated to max. 0 ... 20 mA / 4 ... 20 mA or 0 ... 10 V U: ± (0.5 % + 10 mV) I : ± (0.5 % + 20 µA)
Serial Interface	either RS 232 or RS 485
Transmission Protocol	per DIN Draft 19244
BCD Data Output	
Level	5 V – TTL or 24 V open collector with 4.7 kΩ pull-up resistors
Power Supply	
Supply Voltage	230 V~ (180 ... 264 V) 50 / 60 Hz option: 110 V (90 ... 132 V) 50 / 60 Hz 18 ... 36 V DC / 24 V AC, 50 / 60 Hz
Power Consumption	max. 14 V
A-D Conversion	
Conversion Method	dual slope bipolar
Integration Time	approx. 100 ms
Measurements per Second	typically 3

Ambient Conditions	
Operating Temperature Range	0 ... + 50°C
Storage Temperature Range	– 20 ... + 70°C
Relative Humidity	max. 85%
Housing	
Plastic	polycarbonate blend
Front Panel Dimensions	144 x 72 mm
Bezel Height	8 mm
Bezel Width	5 mm
Bezel Color	black matt option: gray or pebble gray
Installation Depth	max. 150 mm
Weight	basic instrument: approximately 0.6 kg, max. 0.8 kg
Mounting	screw clamp
Terminals	screw terminal blocks
for Interface	subminiature-D plug, 9-pole serial, 25-pole parallel
Compliance with Regulations	
Protection	front panel: IP 54
Protection Class	II
Tested	per EN 61010-1 / VDE 0411-1, for MESSCONTACTER: DIN VDE 0160 as well
Interference Suppression	per VDE 0871

Measured Quantity Designations: Table EM

Measured Quantity	Order Number
%	EM 11
mV	EM 12
V	EM 13
kV	EM 14
mA	EM 15
A	EM 16
Hz	EM 17
µA	EM 19
°C	EM 18
W	EM 21
kW	EM 22
MW	EM 23
var	EM 24
ms	EM 31
min^{-1}	EM 32

Order Information

Features		Article Number	
DIGEM f 144 x 72	Measuring Instrument	A1000	
	MESSCONTACTER		A1001
LED Display	red (standard)	•	•
	green	A1	A1
Limit Values			
Load Current Version	min. min.-max. max. contact	–	B1
	min. min.-min. min. contact	–	B2
	max. max.-max. max. contact	–	B3
Closed-Circuit Current Version	min. min.-max. max. contact	–	B4
	min. min.-min. min. contact	–	B5
	max. max.-max. max. contact	–	B6
Preliminary Contacts	normally open	–	C1
	normally closed	–	C2
Input Magnitudes			
Direct Current	± 2 mA	D01	D01
	± 5/20/50/200 mA, adjustable		
	adjusted to ± 20 mA	D02	D02
	adjusted to ± 200 mA	D03	D03
	adjusted to 0 ... 20 mA	D04	D04
	adjusted to 4 ... 20 mA	D05	D05
	± ... x mA, as requested (min. 5 mA, max. 200 mA)	D90	D90
	± 1 A	D06	D06
	± 2 A	D07	D07
	± ... x mA (min. 200 mA, max. 1 A)	D92	D92
Direct Voltage	± 200 mV	D17	D17
	± 2 V	D10	D10
	± 5/20/50/200 V, adjustable		
	adjusted to ± 20 V	D11	D11
	adjusted to ± 200 V	D12	D12
	adjusted to 0 ... 10 V	D13	D13
	± ... x V, as requested (min. 5 V, max. 500 V)	D91	D91
Alternating Current, Sinusoidal, 3 ½ Place	0 ... 2 mA	D21	D21
	0 ... 20 mA	D22	D22
	0 ... 200 mA	D23	D23
	0 ... x mA	D93	D93
Alternating Voltage, Sinusoidal, 3 ½ Place	0 ... 2 V	D31	D31
	0 ... 20 V	D32	D32
	0 ... 200 V	D33	D33
	0 ... x V, as requested (max. 500 V)	D94	D94
Alternating Current, RMS, 4 ½ Place	0 ... 2 mA	D40	D40
	0 ... 20 mA	D41	D41
	0 ... 200 mA	D42	D42
	0 ... x mA, as requested (max. 200 mA)	D95	D95
	at current transformer ... / 1 A	D43	D43
	at current transformer ... / 5 A	D44	D44
Alternating Voltage, RMS 4 ½ Place	0 ... 2 V	D45	D45
	0 ... 20 V	D46	D46
	0 ... 200 V	D47	D47
	0 ... x V, as requested (max. 500 V)	D96	D96

Features		Article Number	
Temperature			
Pt100			
3-Wire Connection	0 ... 200 °C (0.1°) [1]	D60	D60
	– 200 ... + 800 °C (1.0 °) [1]	D62	D62
	32 ... 392 °F (1.0 °) [1]	D64	D64
	– 328 ... 1473 °F (1.0 °) [1]	D66	D66
2 / 4-Wire Connection	0 ... 200 °C (0.1°) [1]	D61	D61
	– 200 ... + 800 °C (1.0 °) [1]	D63	D63
	32 ... 392 °F (1.0 °) [1]	D65	D65
	– 328 ... 1473 °F (1.0 °) [1]	D67	D67
Thermocouples			
Type J (Fe-CuNi)	– 100 ...+ 900 °C (1.0 °) [1]	D70	D70
	– 148 ...+ 1650 °F (1.0 °) [1]	D71	D71
Type K (NiCr-Ni)	– 190 ...+ 1300 °C (1.0 °) [1]	D72	D72
	– 310 ...+ 2300 °F (1.0 °) [1]	D73	D73
Type R (Pt13 Rh-Pt)	0 ... 1600 °C (1.0 °) [1]	D74	D74
	32 ... 2430 °F (1.0 °) [1]	D75	D75
Type S (Pt10 Rh-Pt)	0 ... 1600 °C (1.0 °) [1]	D76	D76
	32 ... 2430 °F (1.0 °) [1]	D77	D77
Resistance			
0 … 10.000 Ω	2-wire connection	D81	D81
	3-wire connection	D82	D82
	4-wire connection	D83	D83
Frequency			
5.0 … 100.0 … 500.0 Hz, voltage level: 90 … 350 V		D50	D50
0 … 2.000 kHz, voltage level: 90 … 350 V (max. resolution 1 Hz)		D51	D51
R.P.M.			
5.0 … 100.0 … 500.0 Hz	voltage level 5 ... 30 V_{SS}	D52	D52
5.0 … 100.0 … 500.0 Hz	at HF transducer, 2...16V/2-wire	D53	D53
0…2000.0 Hz (int. per. 12 s)	voltage level 5 … 30 V_{SS}	D54	D54
0…2000.0 Hz (int. per. 12 s)	at HF transducer, 2 ... 16V/2-wire	D55	D55
Pulse Counter - Voltage Level: 5 ... 30 V			
Up-counter	xx pulses per digit	D98	D98
Down-counter	xx pulses per digit	D99	D99
Enter the no. of pulses which should cause a 1 digit change at the display in clear text (min. 1 pulse per digit, max. 10 pulses per digit)			
Display Range			
Same as measuring range at max. resolution		•	•
± xxxx, as requested		E91	E91
0 ... xxxx, as requested		E92	E92
xxx ... xxxx, as requested		E93	E93
Display			
With linear relationship to input quantity (standard)		•	•
non-linear relationship to input quantity (as requested, max. 10 break points)		EA9	EA9
cos φ		EA1	EA1
Decimal Points			
Same as measuring range at max. resolution		•	•
no decimal point		ED1	ED1
xxxx . X		ED2	ED2
xxx . XX		ED3	ED3
xx . XXX		ED4	ED4
x . XXXX		ED5	ED5

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Features	Article Number	
Measured Quantity Designation		
Same as input quantity	•	•
without measured quantity labelling	EM1	EM1
select measured quantity from table EM (page 4)	EM . .	EM . .
measured quantity labelling as requested	EM90	EM90
Power Supply		
230 V, 50 / 60 Hz	H1	H1
110 V, 50 / 60 Hz	H2	H2
24 V DC / AC	H3	H3
Outputs		
No analog output (standard)	•	•
0 ... 20 mA	K91	K91
4 ... 20 mA	K92	K92
± 20 mA	K93	K93
0 ... 10 V	K94	K94
1 ... 5 V	K95	K95
as requested (enter display range in clear text)	K99	K99
with BCD data output, 5 V	K06	K06
with BCD data output, 24 V	K07	K07
Interface		
No serial interface (standard)	•	•
V 24 / RS 232 (not available in combination with K06 / K07)	L1	L1
RS 485 (not available in combination with K06 / K07)	L2	L2
Mean Value Display		
No mean value generation (standard)	•	•
mean value from 2 measurements	M1	M1
mean value from 4 measurements	M2	M2
mean value from 8 measurements	M3	M3
mean value from 16 measurements	M4	M4
mean value from 32 measurements	M5	M5
mean value from 64 measurements	M6	M6
mean value from 128 measurements	M7	M7
Rounding of the Last Digit		
No rounding (standard)	•	•
rounding in steps of 2	MA1	MA1
rounding in steps of 5	MA2	MA2
rounding in steps of 10	MA3	MA3
Limit Value Switching Hysteresis		
No switching hysteresis (standard)	•	•
with switching hysteresis (enter number of digits in clear text, max. 127)	MD91	MD91
with response delay (enter time in clear text, max. 120 s)	MD92	MD92

Features	Article Number	
Memory		
No memory (standard)	•	•
storage of minimum and maximum values	N1	–
maximum value display	N2	–
minimum value display	N3	–
storage of alarm messages for MESSCONTACTER	–	N4
Differential Display		
No differential display (standard)	•	•
with set-point versus actual value comparison	ND1	ND1
with automatic taring	ND2	ND2
Bezel		
black matt (standard)	•	•
gray matt, RAL 7037	P1	P1
pebble gray matt, RAL 7032	P2	P2
Front Panel		
GOSSEN-METRAWATT design (standard)	•	•
design as requested	PD..	PD..
Rear Panel Identification		
No identification (standard)	•	•
with identification (enter in clear text)	T9	T9
Additional Labelling at Front		
No additional labelling (standard)	•	•
with labelling at bottom (max. 15 characters, enter in clear text)	TA91	TA91
with labelling at top (max. 15 characters, enter in clear text)	TA92	TA92

[1] see values in parentheses for max. resolution