

## DIGEM f 96 x 48 EK

3-349-002-03  
1/7.98

- Front panel dimensions: 96 x 48 mm
- LED display: red or green, 14 mm high
- Max. display range: -19 999 to + 32 765
- Modular connectors for flexible use
- Simple adjustments at front panel keys
- Up to 4 limit values possible as option
- Adaptable to customer specific characteristic curves
- Addition or subtraction of 2 measurement values
- Multiplication or division of 2 measurement values
- Automatic taring
- Automatic balancing for pressure measurements
- Storage of minimum and maximum measurement values
- Power supply electrically isolated from measuring circuit
- Complies with IEC 1010
- Housing suitable for rack mounting
- Analog output available as option



### Applications

The DIGEM f 96 x 48 EK is a precision, modular rack mount instrument which can be adapted to specific measuring tasks through the use of a wide variety of various measuring modules. Scaling and set-points can be easily adjusted with the keys at the front panel, even after the instrument has been installed.

The range of applications can also be expanded with extra functions, so that the measuring instrument can be adapted to the task at hand in an ideal fashion.

The instrument can be equipped to perform the following measurements:

- Direct current and direct voltage
- Sinusoidal alternating current and alternating voltage
- Alternating current and alternating voltage, RMS
- Temperature
- Frequency and r.p.m.
- Pressure
- Pulse counting  
(see page 3, chapter 11 for function and mode of operation)
- Display in  $\cos \varphi$
- Non-linear input quantities

### Description

The DIGEM f 96 x 48 EK is a programmable rack mount measuring instrument with extremely high resolution. The maximum display range is -19 999 to + 32 765.

The display can be expanded to 99 990 for positive values by means of an adjustable multiplier.

The basic instrument is comprised of a precision DC voltmeter. A measuring module is installed to each instrument at the factory. The instrument is adapted to a specific measuring task with the appropriate range module.

Digital linearization is accomplished with an integrated microcomputer for temperature measurements.

The keys at the front panel allow for simple, accurate adjustment of limit values and set-points. The safeguarding of data against unauthorized changes can be assured with a switch at the back-side of the front panel, or alternatively with an external contact. The following functions can also be adjusted at an additional programming level with the keys at the front panel:

- Zero point shifting over the entire range
- Adjustment of the measuring span
- Matching of non-linear input quantities
- Additional measurement value tendency display
- Storage of minimum and maximum measurement values
- Automatic taring
- Mean value calculation for several measurements
- Rounding of the last place
- Multiplication of the display value by a factor of 10

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The settings for these functions are secured at the factory against change with a separate switch at the backside of the front panel. Preset values remain in storage even if a mains failure occurs.

The MESSCONTACTER model provides for the selection of a maximum of four limit values. The alarm circuit is equipped with relays.

The switching condition of the relays is also indicated by means of LEDs. Indication of an alarm condition can be indicated optically by means of a blinking display for all limit values.

This model also includes the following features:

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

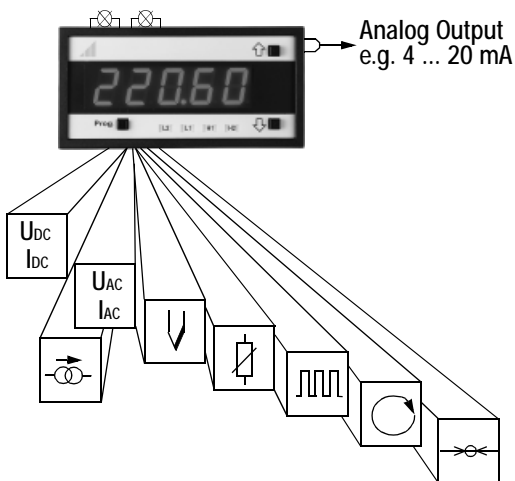
## Applicable Regulations and Standards

IEC 1010-1	Safety requirements for electrical equipment for measurement, control and laboratory use
EN 50022	Class B interference suppression
IEC 801-2 through 5	EMC interference immunity
DIN 40040	Utilization category and reliability data for telecommunications and electronic components

## Programming

Each measuring instrument is programmed at the factory according to customer requirements. Subsequent reprogramming is also possible without removing the instrument from its rack.

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



## Function and Mode of Operation for Extra Functions

### 1. Storage of Minimum and Maximum Values

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

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

Stored values can be queried by activating the  $\uparrow$  and  $\downarrow$  keys.

### 2. Automatic Taring

An input quantity is measured and stored to memory by pressing the "P" key. The measuring instrument displays the difference of the current measurement value minus the stored input quantity.

### 3. Addition and Subtraction of Measurement Values

The measuring instrument can be equipped at the factory with two measurement inputs for DC measuring ranges. Depending upon which option has been selected, this version of the instrument displays either the sum or the difference of the two measurement values.

### 4. Multiplication and Division of Measurement Values

The measuring instrument can multiply or divide two values from the DC measuring ranges. This version of the instrument is equipped at the factory with two measuring inputs.

The following value is displayed for multiplication  $U_1 \times \left(\frac{U_2}{20000}\right)$ .  
The following value is displayed for division  $\frac{(U_1 \times 20000)}{U_2}$ .

### 5. 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-value generation can also be selected.

### 6. Tendency Display

The function of the two LEDs used for alarm signals can be re-configured such that rising or falling tendencies for gradually changing measurement values can be detected and indicated (e.g. temperature).

### 7. Calibration

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

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

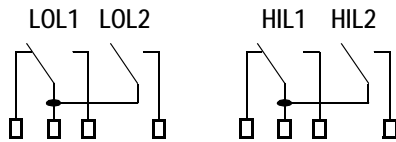
### 8. Automatic Balancing for Pressure Measurement

Automatic balancing is accomplished for pressure measurements by pressing the "P" key. After the "P" key has been activated, the instrument balances the lower limit of the effective range (e.g. zero). If the program key is activated again, the measuring span is also automatically balanced. The new values are stored to memory, and remain in memory even if a mains failure occurs.

## 9. Limit Values Option

Each measuring instrument can be equipped with two or four limit values.

Limit values LOL1 and HIL1 are each provided with a changeover contact for alarm messages. The other limit values, LOL2 and HIL2, are each provided with a normally open contact. The LOL2 contact is connected to the LOL1 contact as shown in the following diagram. The same applies to the HIL2 and HIL1 contacts.



The relays can be configured either for 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 limit value violations are also indicated in an unambiguous fashion by means of LEDs at the same time.

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 required. 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 a key, or with an external signal applied at the hold input.

Switching hysteresis can be adjusted for the relay tripping limit values in steps of 1 from 0 to  $\pm 127$  digits. Alternatively, a response delay ranging from 0 ... 120 s can be selected. The mean value of the measurement values is calculated and compared with the limit values during this delay time.

## 10. Pulse Counter

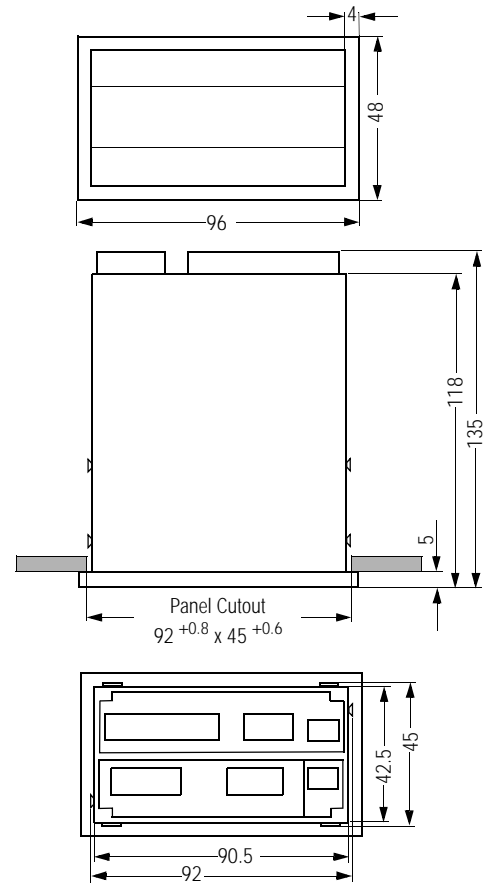
If the "counter" function has been selected for the measuring instrument the overflow display "---" appears when the instrument is switched on.

The counter can be reset with the help of the  $\uparrow$  and  $\downarrow$  keys.

All pulses which occur at the measurement input are counted and stored to memory. The instrument can count up to 32,762 pulses. The value is displayed which results from multiplying the value in memory with the selected multiplication factor (0.0001 to 1.9999).

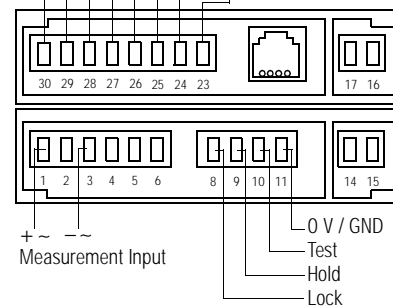
The contents of the memory are deleted when the measuring instrument is switched off.

## Dimensional Drawing

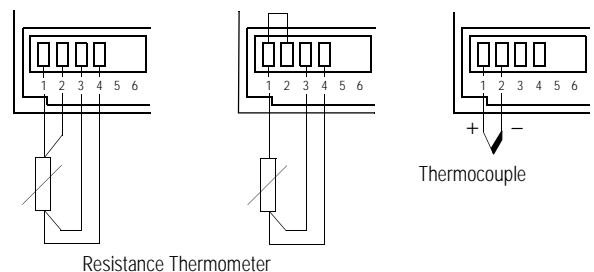


## Connector Pin Assignments

LOL2, NO Contact  
LOL1/2, Changeover  
LOL1 NC, Contact  
LOL1 NO, Contact  
HIL1, NO Contact  
HIL1, NC Contact  
HIL1/2, Changeover  
HIL2, NO Contact



Terminal 9 may not be connected to terminal 11 when supply voltage is on.



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## Characteristic Values

<b>Display</b>	
Type	7 segment LED
Color	red / optionally green
Character Height	14 mm
Display Range	-19 999 to 32 765
Polarity	"-" is automatically displayed
Overflow Display	"- - - - -"
<b>Input</b>	
1 measuring range dependent upon measuring module	see Order Information / ID Number
Max. voltage between measurement input and housing	250 V <sub>eff</sub> for 700 VAC range, max. 1000 V
<b>Error Limits for Basic Instrument without Measuring Module</b>	
Temperature Coefficient	< 15 ppm / K
Zero Point Drift	0.005%
Non-Linearity	< 0.005%
Series-Mode Rejection Ratio	> 120 dB at 50 / 60 Hz
<b>Control Commands</b>	
Storage of Display Value	externally controlled
Reset	externally controlled
Lock Settings	externally controlled
<b>Power Supply</b>	
Depending upon Model	230 V AC, 115 V AC
Power Consumption	max. 5 VA
<b>Ambient Conditions</b>	
Operating Temperature Range	0 ... 50°C
Storage Temperature Range	- 20 ... + 70°C
Relative Humidity	max. 85%
<b>Housing</b>	
Material	metal half-shells
Front Dimensions	96 x 48 mm
Panel Cutout	45 + 0.6 x 96 + 0.8 mm
Bezel Height	5 mm
Bezel Color	black, options: gray, light gray, pebble grey or dark beige
Installation Depth	max. 125 mm
Weight	approx. 0.9 kg
Terminal Connectors	screw terminal blocks
<b>Input Quantities from Measuring Modules</b>	
<b>DC Voltage / Current</b>	
Voltage:	
Input Resistance	> 1 MΩ
Overload	10-fold (observe max. voltage for basic instrument)
Current:	
Voltage Drop	max. 2 V
Overload	2-fold, max. 300 mA
Error Limits for DC Ranges	± (0.05 % + 1 digit)
Temperature Coefficient	> 80 ppm / K
<b>AC Voltage / Current</b>	
Voltage:	
Input Resistance	> 1 MΩ
Overload	10-fold (observe max. voltage for basic instrument)
Current:	
Voltage Drop	max. 2 V
Overload	2-fold, max. 300 mA for 1 A & 5 A: 30-fold for 1 sec.
Error Limits for AC Ranges:	
45 ... 65 Hz	± (0.2% + 0.2% of meas. range)
20 Hz ... 1 kHz	± (0.2% + 0.2% of meas. range)
Temperature Coefficient	0.01% + 0,01 mV / K
<b>AC True RMS</b>	
Voltage:	
Input Resistance	> 1 MΩ
Overload	10-fold (observe max. voltage for basic instrument)
Current:	
Voltage Drop	max. 2 V
Overload	2-fold, max. 300 mA for 1 A & 5 A: 30-fold for 1 sec.
<b>Error Limits for True RMS</b>	
45 ... 65 Hz	± (0.2% + 0.2% of meas. range)
20 Hz ... 1 kHz	± (0.2% + 0.2% of meas. range)
Crest Factor	6 (additional 0.5 %)
Temperature Coefficient	(0.01% + 0.01 mV) / K
<b>Temperature Measurement with Pt100</b>	
Current at the Sensor	2 mA
Max. Error	< 0.5°C
Temperature Coefficient	< 150 ppm / K
Offset Drift	< 0.1 digit
<b>Temperature Measurement with Thermocouples</b>	
Linearization Error	< 1 K
Cold Spot Compensation Error	< 2 K / 10 K for 10 ... 50°C
Broken Cable Display	"- - -"
Temperature Coefficient	< 150 ppm / K
Offset Drift	< 0.1 digit

## Frequency and R.P.M. Measurement

For ranges to 500 Hz

Resolution	0.1 Hz
Measurement Duration	< 300 ms
Error Limits	< 0,15 Hz

For ranges > 500 Hz

Error Limits	± 1 digit
Time Base	± 50 ppm
Temperature Coefficient	< 2 ppm / K

## Optional Relays

for LOL1 and HIL1	1 changeover contact each
for LOL2 and HIL2	1 normally open contact each
Switching Time	max. 400 ms
Switching Hysteresis	adjustable from ± 0 digits to ± 127 digits
Time Delay	adjustable from ± 0 s to ± 120 s
Switching Capacity	5 A / 240 V

## 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 <sup>-1</sup>	EM 32

## Order Information

Features		ID Number
DIGEM f 96 x 48 EK	Measuring Instrument	A1262
LED Display	red (standard)	•
	green	A1
<b>Limit Values</b>		
	without limit values	C0
<b>2 Limit Values</b>		
Load Current Version	min.-max. contact	C1
	min.-max. contact	C2
	min.-max. contact	C3
Closed-Circuit Current Version	min.-max. contact	C4
	min.-max. contact	C5
	min.-max. contact	C6
<b>4 Limit Values</b>		
Load Current Version	min. min.-max. max. contact	C7
	min. min.-min. min. contact	C8
	max. max.-max. max. contact	C9
Closed-Circuit Current Version	min. min.-max. max. contact	C10
	min. min.-min. min. contact	C11
	max. max.-max. max. contact	C12
<b>Measuring Ranges</b>		
Direct Current 1 Measurement Value	± 2 mA	D001
	± 20 mA	D002
	± 200 mA	D003
	0 ... 20 mA	D004
	4 ... 20 mA	D005
	± 1 A	D006
	± 2 A	D007
	± xx mA	D900
	0 ... xx mA	D901
	4 ... 20 mA with power supply for 2-wire measuring transducer	D008
Direct Voltage 1 Measurement Value	± 2 V	D010
	± 20 V	D011
	± 200 V	D012
	0 ... 10 V	D013
	± xx V (min. 2 V, max. 250 V)	D910
	0 ... xx V	D911
At Shunt Resistor	± 60 mV	D015
	± 150 mV	D016
Direct Voltage / Current 2 Measurement Values	U1: ± xx V; U2: xx V (min. 2 V, max. 20 V)	D960
	I1: ± xx mA; I2: xx mA (min. 2 mA, max. 20 mA)	D961
	I1: 4 ... 20 mA I2: 4 ... 20 mA	D962
Alternating Current, Sinusoidal	0 ... 2 mA	D021
	0 ... 20 mA	D022
	0 ... 200 mA	D023
	0 ... xxx mA (max. 200 mA)	D920
	0 ... 1 A	D027
	0 ... 5 A	D028
Alternating Voltage, Sinusoidal	0 ... 2 V	D031
	0 ... 20 V	D032
	0 ... xx V	D923
	0 ... 200 V	D037
	0 ... 700 V	D038

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Features	ID Number	
<b>Measuring Ranges</b>		
<b>Alternating Current, True RMS</b>	0 ... 2 mA	D200
	0 ... 20 mA	D201
	0 ... 200 mA	D202
	0 ... xxx mA (max. 200 mA)	D930
	0 ... 1 A	D207
	0 ... 5 A	D208
<b>Alternating Voltage, True RMS</b>	0 ... 2 V	D210
	0 ... 20 V	D211
	0 ... 200 V	D212
	0 ... 700 V	D213
	0 ... xx V (min. 2 V, max. 200 V)	D933
<b>Temperature, Pt100</b>		
3-wire connection	- 200.0 ... + 800.0 °C	D062
	- 328 ... + 1473 °F	D064
2 / 4-wire connection	- 200.0 ... + 800.0 °C	D063
	- 328 ... + 1473 °F	D065
<b>Thermocouples</b>		
Type J (Fe-CuNi)	- 0 ... + 760 °C	D310
	- 32 ... + 1260 °F	D311
	- 190 ... + 1300 °C	D320
	- 310 ... + 2300 °F	D321
	0 ... 1600 °C	D330
	32 ... 2900 °F	D331
	0 ... 1600 °C	D340
	32 ... 290 °F	D341
<b>Resistance</b>		
0 ... 10,000 Ω	2-wire connection	D081
	3-wire connection	D082
	4-wire connection	D083
0 ... 2000 Ω	2-wire connection	D084
	3-wire connection	D085
	4-wire connection	D086
0 ... 200 Ω	2-wire connection	D087
	3-wire connection	D088
	4-wire connection	D089
<b>Frequency</b>		
5.0 ... 100.0 ... 500.0 Hz, voltage level 5 ... 30 V	D052	
0 ... 2.000 kHz, voltage level 5 ... 30 V	D054	
0 ... 20.000 kHz (5 ... 30 V)	D056	
0 ... 200.00 kHz (5 ... 30 V)	D058	
5.0 ... 100.0 ... 500.0 Hz 90 - 360 V	D050	
0 ... 2000.0 Hz (90 ... 360 V)	D051	
5.0 ... 100.0 ... 500.0 Hz (open collector)	D053	
0 ... 2000.0 Hz (open collector)	D055	
0 ... 20.000 kHz (open collector)	D057	
<b>For Pressure Sensors</b>		
xx, x mV / V (min. 2 mV / V, max. 20 mV / V)	D990	
<b>Pulse Counter - Voltage Level 5 ... 30 V<sub>ss</sub></b>		
Up-counter - xxx pulses per digit	D950	
Down-counter - xxx pulses per digit	D951	

Features	ID Number
<b>Measurement Value Logic Operations</b>	
Only possible with 2 measurement inputs	
Display = U1 + U2 or. I1 + I2	DV1
Display = U1 - U2 or. I1 - I2	DV2
Display = (U1 x 20 000) / U2	DV3
Display = U1 x (U2 / 20 000)	DV4
<b>Display Range</b>	
Same as measuring range at max. resolution (standard)	•
± xxxx, as requested	E091
0 ... xxxx, as requested	E092
xxx ... xxxx, as requested	E093
1: xxx ... xxx      2: xxx ... xxx, as requested	E094
<b>Display</b>	
With linear relationship to input quantity (standard)	•
non-linear relationship to input quantity (as requested, max. 10 break points)	EA9
cos φ	EA1
with automatic taring (display = current measurement value - tare value)	EA2
<b>Decimal Points</b>	
Same as measuring range at max. resolution (standard)	•
no decimal point	ED1
xxxx . X	ED2
xxx . XX	ED3
xx . XXX	ED4
x . XXXX	ED5
<b>Measured Quantity Designation</b>	
Same as measuring range (standard)	•
with no measured quantity labelling	EM1
see table EM on page 5 for measured quantities	EM . .
measured quantity labelling as requested	EM90
<b>Supply Voltage</b>	
230 V, 50 / 60 Hz	H1
110 V, 50 / 60 Hz	H2
<b>Analog Output (only in combination with C1)</b>	
<b>No analog output</b>	•
0 ... 20 mA (for display range: xxx ... xxx)	K90
4 ... 20 mA (for display range: xxx ... xxx)	K91
0 ... 10 V (for display range: xxx ... xxx)	K92
1 ... 5 V (for display range: xxx ... xxx)	K93
as requested	K99
<b>Mean Value Display</b>	
<b>No mean value generation</b>	•
mean value from 2 measurements	M1
mean value from 4 measurements	M2
mean value from 8 measurements	M3
mean value from 16 measurements	M4
mean value from 32 measurements	M5
<b>Rounding of the Last Place</b>	
<b>No rounding</b>	•
round in steps of 2	MA1
round in steps of 5	MA2
round in steps of 10	MA3
<b>Switching Hysteresis</b>	
<b>No switching hysteresis</b>	•
with switching hysteresis (enter max. number of digits in clear text)	MD91
with response delay (enter number of seconds in clear text)	MD92

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Features	ID Number
<b>Memory</b>	
<b>No memory</b>	•
storage of minimum and maximum values	N1
maximum value display	N2
minimum value display	N3
store alarm messages to memory	N4
<b>Bezel</b>	
<b>Black, matt</b>	•
gray, matt RAL 7037	P1
pebble gray, matt RAL 7032	P2
light gray, matt RAL 7035	P3
dark beige, matt	P4

Features	ID Number
<b>Front Panel</b>	
<b>GOSSEN-METRAWATT design</b>	•
design as requested	PD..
<b>Mounting</b>	
<b>DIN screw clamps</b>	•
manual slot-mount	RM1
<b>Rear Panel Identification</b>	
<b>No identification</b>	•
with identification (enter in clear text)	T9
<b>Additional Labelling</b>	
<b>No additional labelling</b> (standard)	•
with labelling at top (max. 15 characters)	TA92

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