Digital metering instruments and current transformers

Lovato electric

100% electricity

Digital metering instruments, DMK series:

96x48mm
Flush-mount version

Modular version

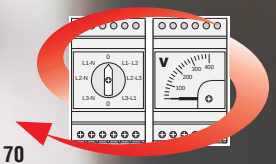
Single - phase

Single-function

- Voltmeter
- Ammeter
- Voltmeter or Ammeter
- Frequency meter
- Cosphi meter.

V	VOLTMETER	Without output relay With output relay	DMK 00 DMK 00 R1	DMK 80 DMK 80 R1
A	AMMETER	Without output relay With output relay	DMK 01 DMK 01 R1	DMK 81 DMK 81 R1
V A	VOLTMETER OR AMMETER		DMK 02	DMK 82
Hz	FREQUENCY METER	Without output relay With output relay	DMK 03 DMK 03 R1	DMK 83 DMK 83 R1
	COSPHI METER	Without output relay With output relay	DMK 04 DMK 04 R1	DMK 84 DMK 84 R1

1 instrument only instead of **2**



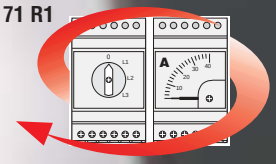
Three - phase

Single-function

- Voltmeter
- Ammeter.

V	VOLTMETER	Without output relay With output relay	DMK 10 DMK 10 R1	DMK 70 DMK 70 R1
A	AMMETER	Without output relay With output relay	DMK 11 DMK 11 R1	DMK 71 DMK 71 R1

1 instrument only instead of **2**

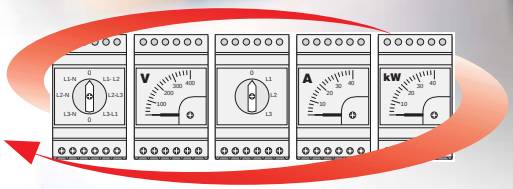


Multifunction

- Measure of:
  - Voltage
  - Current
  - Active power.

	COMBINED VOLTMETER, AMMETER AND WATTMETER	Without output relay With output relay	DMK 15 DMK 15 R1	DMK 75 DMK 75 R1

1 instrument only instead of **5**



Multimeter

- Measure of:
  - Voltage
  - Current
  - Active power
  - Reactive power
  - Apparent power
  - Power factor
  - Frequency
  - Active energy
  - Reactive energy
  - Hour counter.

DMK 16

Main characteristics
DMK0..., DMK1..., DMK8... and DMK7...

- Auxiliary supply: 220-240VAC
- Operating frequency: 50-60Hz
- TRMS measure
- Voltage measure accuracy: Class 0.5 (±0.25% full scale ±1 digit)
- Current measure accuracy: Class 0.5 (±0.5% full scale ±1 digit)
- Memory storage of maximum and minimum values
- 1 relay output with one changeover contact, rated 8A 250VAC AC1/B300 (DMK...R1 version only)
- 1 relay output with one NO contact, rated 8A 250VAC AC1/B300 (DKM 75 R1 version only)
- Degree of protection on front: IP40 for modular version IP54 for flush-mount version
- Ambient operating temperature: -20...+60°C
- 3 module housing (DIN 43880) for modular version
- 96x48mm for flush-mount version
- 4mm^2 terminals.

Measure, protection and automation

47 electrical parameters

Multimeters for LV systems

- Measure of:
  - Voltage
  - Current
  - Power
  - Power factor
  - Frequency
- Logging of minimum and maximum values
- Versions:
  - With operating hour counters
  - With energy meters
  - With serial port
  - For use with generating sets.

DMK 2...

DMK 5...

251 electrical parameters

Multimeters (analysers) for LV-MV-HV systems

- Measure of:
  - Voltage
  - Current
  - Power
  - Displacement power factor and power factor
  - Frequency
- Import-export energy meters
- Harmonic analysis on current and voltage values
- Logging of minimum and maximum values
- Versions:
  - Basic with on-board measure viewing only
  - Viewing and 2 programmable outputs
  - Viewing, 2 programmable outputs and RS485 serial port
  - Basic with data-logger and RS232/RS485 serial ports.

DMK 3... - DMK 40

DMK 6...

Lovato electric

Single - phase

Voltmeter

- Voltage measure range: 15-660VAC
- Frequency range: 45-65Hz
- PT ratio programming: 1.00-500.00
- Accuracy: Class 0.5 (±0.25% f.s. ±1 digit)

3 viewed measures:
1 voltage value
1 maximum voltage
1 minimum voltage.

DMK 00 R1
DMK 80 R1
Voltmeter with relay output

FUNCTION	RANGE
Voltage loss	OFF/5-85%
Maximum voltage	OFF/102-120%
Minimum voltage	OFF/70-98%
Time delay for maximum, minimum or voltage loss ❶	0.0-900.0s

❶ Independent adjustable delays.

Ammeter

- Current measure range: 0.05-5.75A
- Frequency range: 45-65Hz
- CT primary programming: 5-10,000
- Accuracy: Class 0.5 (±0.5% f.s. ±1 digit)

3 viewed measures:
1 current value
1 maximum current
1 minimum current.

DMK 01 R1
DMK 81 R1
Ammeter with relay output

FUNCTION	RANGE
Current loss	OFF/2-100%
Maximum current	OFF/102-200%
Maximum current instantaneous tripping	OFF/110-600%
Minimum current	OFF/5-98%
Time delay for maximum, minimum or current loss ❶	0.0-900.0s

❶ Independent adjustable delays.

Voltmeter or ammeter

- Voltage measure range: 15-660VAC
- Current measure range: 0.05-5.75A
- Frequency range: 45-65Hz
- PT ratio programming: 1.00-500.00
- CT primary programming: OFF/5-10,000
- Accuracy: Class 0.5
  (voltage ±0.25% f.s. ±1 digit)
  (current ±0.5% f.s. ±1 digit)

3 viewed measures:
1 voltage or current value
1 maximum voltage or current
1 minimum voltage or current.

DMK 02
DMK 82
Voltmeter or ammeter

The DMK 82 metering instrument can operate as voltmeter or ammeter.
The Customer will therefore receive only one instrument but two front plates, V and A, and will fit the proper plate, based on how it is used.

Frequency meter

- Measure input: 15-660VAC
- Frequency measure range: 15-65Hz
- Accuracy: Class 0.5 (±1 digit)

3 viewed measures:
1 frequency value
1 maximum frequency
1 minimum frequency.

DMK 03 R1
DMK 83 R1
Frequency meter with relay output

FUNCTION	RANGE
Maximum frequency	OFF/101-110%
Minimum frequency	OFF/90-99%
Time delay for maximum or minimum frequency ❶	0.5-900.0s

❶ Independent adjustable delays.

Cosphi meter

- Cosφ measure in 4 quadrants
- Accuracy: Class 0.5 (±1° ±1 digit)

2 viewed measures:
1 cosφ value
1 power factor value.

DMK 04 R1
DMK 84 R1
Cosphi meter with relay output

FUNCTION	RANGE
Maximum cosφ threshold	OFF/0.1Ind-0.1Cap
Minimum cosφ threshold	OFF/0.1Ind-0.1Cap
Maximum PF threshold	OFF/0.10-1.00
Minimum PF threshold	OFF/0.10-1.00
Time delay for maximum or minimum threshold ❶	1-9,000s

❶ Independent adjustable delays.

Three - phase

Voltmeter

- Voltage measure range: 15-660VAC
- Frequency range: 45-65Hz
- PT ratio programming: 1.00-500.0
- Accuracy: Class 0.5 (±25% f.s. ±1 digit)

18 viewed measures:
3 phase voltages
3 phase-to-phase voltages
3 maximum phase voltages
3 maximum phase-to-phase voltages
3 minimum phase voltages
3 minimum phase-to-phase voltages.

DMK 10 R1 DMK 70 R1	Voltmeter with relay output
FUNCTION	RANGE
Voltage	
Phase loss	OFF/5-85%
Maximum voltage	OFF/102-120%
Minimum voltage	OFF/70-98%
Asymmetry	OFF/2-20%
Phase sequence	OFF/L1-L2-L3/ L3-L2-L1
Frequency	
Maximum frequency	OFF/101-110%
Minimum frequency	OFF/90-99%
Time delay for maximum or minimum voltage, phase loss, asymmetry, minimum or maximum frequency ❶	0.0-900.0s

❶ Independent adjustable delays.

Ammeter

- Current measure range: 0.05-5.75A
- Frequency range: 45-65Hz
- CT primary programming: 5-10,000
- Accuracy: Class 0.5 (±0.5% f.s. ±1 digit)

9 viewed measures:
3 phase currents
3 maximum phase currents
3 minimum phase currents.

DMK 11 R1 DMK 71 R1	Ammeter with relay output
FUNCTION	RANGE
Current loss	OFF/2-100%
Maximum current	OFF/102-200%
Maximum current instantaneous tripping	OFF/110-600%
Minimum current	OFF/5-98%
Unbalance	OFF/2-20%
Time delay for maximum or minimum current, current loss or asymmetry ❶	0.0-900.0s

❶ Independent adjustable delays.

Combined voltmeter, ammeter and wattmeter

Multimeter

For DMK 15 - DMK 75 - DMK 15 R1 - DMK 75 R1 - DMK 16

- Voltage measure range: 35-660VAC
- Current measure range: 0.05-5.75A
- Frequency measure range: 45-65Hz
- PT ratio programming: 1.00-500.0
- CT ratio programming: 5-10,000
- Voltage and current accuracy: Class 0.5 (voltage ±0.25% f.s. ±1 digit) (current ±0.5% f.s. ±1 digit)
- Energy accuracy (DMK 16 only): Class 2 (IEC/EN 61036 and IEC/EN 61268)

39 viewed measures
3 phase voltage values
3 phase to phase voltage values
3 phase current values
4 active power values, phase-total
3 maximum phase voltage values
3 maximum phase to phase voltage values
3 maximum phase current values
4 maximum active power values, phase-total (DMK 15 and DMK 75 only)
3 minimum phase voltage values (DMK 15 and DMK 75 only)
3 minimum phase to phase voltage values (DMK 15 and DMK 75 only)
3 minimum phase current values (DMK 15 and DMK 75 only)
4 minimum active power values, phase-total.

33 in addition for DMK 16 only
4 reactive power values, phase total
4 apparent power values, phase-total
3 phase power factor values
1 frequency value
1 active energy value in kWh
1 reactive energy value in kvarh
1 hour counter
4 each minimum and maximum reactive power values, phase-total
4 each minimum and maximum apparent power values, phase-total
1 each minimum and maximum frequency value.

DMK 15 R1 DMK 75 R1	Voltmeter, ammeter and wattmeter with relay output
FUNCTION	RANGE
Voltage	
Phase loss	OFF/5-85%
Maximum voltage	OFF/102-120%
Minimum voltage	OFF/70-98%
Asymmetry	OFF/2-20%
Phase sequence	OFF/L1-L2-L3/ L3-L2-L1
Current	
Current loss	OFF/2-100%
Maximum current	OFF/102-200%
Maximum current instantaneous tripping	OFF/110-600%
Minimum current	OFF/5-98%
Unbalance	OFF/2-20%
Power	
Rated power	1-10,000
Maximum power	OFF/101-200%
Maximum power instantaneous tripping	OFF/110-600%
Minimum power	OFF/10-99%
Frequency	
Maximum frequency	OFF/101-110%
Minimum frequency	OFF/90-99%
Time delay for maximum or minimum voltage/current, current/phase loss, asymmetry, maximum or minimum power ❶	0.0-900.s

❶ Independent adjustable delays.

Three - phase

Multimeters to view 47 electrical parameters

- Auxiliary supply: 208-240VAC;
  12-24VDC for DMK 25 and DMK 26 only
- Voltage measure range: 60-830VAC L-L and 30-480VAC L-N
- Frequency measure range: 45-65Hz
- Current measure range: 0.05-6A
- CT ratio programming: 1.0-2,000
- Voltage and current accuracy: Class 0.5 (±0.25% f.s. ±1 digit)
- Energy accuracy: Class 2 (IEC/EN 61036 and IEC/EN 61268)
- Degree of protection: IP54 on front for DMK 2…
  IP41 on front for DMK 5…
  IP20 at rear
- Ambient operating temperature: -20…+60°C.

Multimeters to view 251 electrical parameters

- Auxiliary supply: 100-240VAC and 110-250VDC
- Auxiliary supply: 24-48VDC (for DMK 32 D048 only)
- Voltage measure range: 20-830VAC L-L and 10-480VAC L-N
- PT ratio programming: 1.0-5,000
- Frequency measure range: 45-65Hz
- Current measure range: 0.02-6A
- CT ratio programming: 1.0-2,000
- Voltage and current accuracy: Class 0.5 (±1 digit)
- Energy accuracy: Class 1(IEC/EN 61036 and IEC/EN 61268)
- Degree of protection: IP54 on front for DMK 3… and DMK 40
  IP41 on front for DMK 6…
  IP20 at rear
- Ambient operating temperature: -20…+60°C.

Summary table

	47 electrical parameters					251 electrical parameters			
96x96mm flush-mount version / Modular version	DMK 25	DMK 26	DMK 20 DMK 50	DMK 21 DMK 51	DMK 22 DMK 52	DMK 30 DMK 60	DMK 31 DMK 61	DMK 32 DMK 62	DMK 40
Instantaneous measures: Instantaneous measures: Voltage (phase to phase, phase, system) Current Apparent power (phase, system) Active-reactive import power (phase, system) Frequency (input voltage) Power factor (phase)	●	●	●	●	●	●	●	●	●
Cosφ Active-reactive export power (phase, system), system integral apparent power						●	●	●	●
Battery supply voltage	●	●							
Voltage asymmetry Current unbalance		●			● ❶				
Harmonic analysis Even-odd, 2° to 22° orders, of phase voltages and currents Total and residual distortion						●	●	●	●
Meter/Counter									
Imported active-reactive energy power				●	●	●	●	●	●
Exported active-reactive energy power						●	●	●	●
Total and partial operating hours	●	●	●						
Storage of instantaneous minimum and maximum values									
Voltage and current (phase)	●	●	●	●	●	●	●	●	●
Import active-reactive power (system)	●		●	●	●	●	●	●	●
Export active-reactive power (system) Average/maximum integral active-apparent power						●	●	●	●
Digital outputs 1 relay, rated 5A 250V AC1 1 static, rated 55mA 60VAC/DC AC1							●	●	
Serial interface									
RS485 port					●			●	●
RS232 port									●

❶ Available with the use of DMK SW remote control software only.

DMK 40 Data-logger

DMK 40 data-logger technical characteristics are:

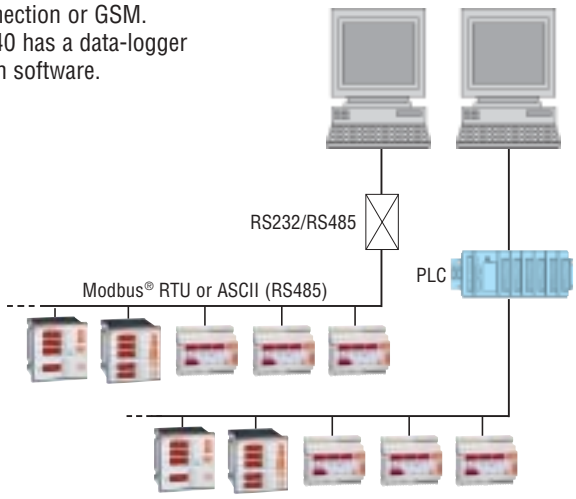
- 2Mb non-volatile data memory
- Real time clock with internal removable back-up lithium battery
- Sampling period, programmable: 1s to 24h
- Number of measures sampled at a time, programmable: 1 to 32
- Modbus® RTU or ASCII communications protocols
- Constant data acquisition or start-stop recording, enabled by programmable thresholds, for one of the selected measures
- Stopping the data-logger with full memory or overwriting old data.

Examples of data acquisition:

- 5 measures (3 I, V and W), 2s sampling = 25 hour data file
- 4 measures (Wh, varh, average W and var), 15min sampling = 3 year data file
- 30 measures (3-5-7-9-11 harmonic orders), 5s sampling = 1 day data file
- 32 measures, 1s sampling = 3 hour and 30 minute data file.

Serial interface

- DMK 22, DMK 32, DMK 40, DMK 52 and DMK 62 have the RS485 serial port opto-isolated, with Modbus® RTU and Modbus® ASCII protocols, assuring interface with the most diffused monitoring and automated systems. RS232 serial port opto-isolated for DMK 40 only.
  Modbus® ASCII also consents to communicate via modem, either direct connection or GSM.
- The DMK 40 has a data-logger supervision software.



DMK SW Remote control supervision software

The DMK SW remote control software consents to supervise a maximum of 64 digital multimeters, DMK 22 and/or DMK52 and/or DMK32 and/or DMK 40 and/or DMK 62, connected in a single RS485 bus.
The DMK SW is subdivided in modules which warrant simple use:

- Main synoptic page that groups the most important data coming from various DMKs
- Detail page with indicators of one specific DMK
- Data acquisition for logging the required measures on disk
- Events-alarms list logged from all the units including those acquired by data elaboration of the software itself
- Plot graphs to check the measures trend
- Harmonic content analysis viewed in bar graph format
- Energy logging to periodically measure and read the energy meters of the various units to keep consumption under control.
- Direct RS232 and RS485 connection to computer or by analog or GSM modem or Ethernet-to-serial gateways.

DMK SW10 Data-logger supervision software for DMK 40

The DMK SW10 includes both the data-logger and DMK SW remote control supervision softwares.
The data-logger software consents to:

- Configure the multimeter parameters, both for the data-logger and the installations set-up, such as PT-CT ratios, etc.
- View and print data recorded in the multimeter storage memory, either in table or graph/trend format; the data-logger can neither be configured nor consulted from the multimeter front
- Data download in ACCESS, EXCEL or TEXT format file
- View all the actual electrical measures on a virtual multimeter front panel
- Set the real time clock, with daylight saving time management
- Connect with multimeters directly or via modem
- Direct RS232 and RS485 connection to computer or by analog or GSM modem.

How to order

Metering instruments / Multimeters

Quantity per package: 1

Order code		Description	Weight [kg]	
Flush-mount	Modular		Flush-mount	Modular
SINGLE - PHASE INSTRUMENTS				
DMK 00	**DMK 80**	Single-phase digital voltmeter	0.290	0.237
DMK 00 R1	**DMK 80 R1**	Single-phase digital voltmeter with programmable relay output	0.323	0.268
DMK 01	**DMK 81**	Single-phase digital ammeter	0.290	0.237
DMK 01 R1	**DMK 81 R1**	Single-phase digital ammeter with programmable relay output	0.323	0.268
DMK 02	**DMK 82**	Single-phase digital voltmeter or ammeter	0.290	0.241
DMK 03	**DMK 83**	Frequency meter	0.290	0.237
DMK 03 R1	**DMK 83 R1**	Frequency meter with programmable relay output	0.323	0.268
DMK 04	**DMK 84**	Single-phase cosphi meter	0.290	0.241
DMK 04 R1	**DMK 84 R1**	Single-phase cosphi meter with programmable relay output	0.323	0.272
THREE - PHASE INSTRUMENTS				
DMK 10	**DMK 70**	Three-phase digital voltmeter	0.297	0.233
DMK 10 R1	**DMK 70 R1**	Three-phase digital voltmeter with programmable relay output	0.330	0.264
DMK 11	**DMK 71**	Three-phase digital ammeter	0.292	0.241
DMK 11 R1	**DMK 71 R1**	Three-phase digital ammeter with programmable relay output	0.326	0.272
DMK 15	**DMK 75**	Three-phase combined digital voltmeter, ammeter and wattmeter	0.332	0.271
DMK 15 R1	**DMK 75 R1**	Three-phase digital voltmeter, ammeter and wattmeter c/w relay output	0.350	0.280
DMK 16	–	Multimeter	0.350	0.280
THREE - PHASE MULTIMETERS				
DMK 20	**DMK 50**	47 electrical parameters	0.434	0.398
DMK 21	**DMK 51**	47 electrical parameters, energy meters included	0.477	0.420
DMK 22	**DMK 52**	47 electrical parameters, energy meters and RS485 included	0.477	0.420
DMK 25	–	47 electrical parameters, 12-24VDC supply	0.350	–
DMK 26	–	47 electrical parameters, maximum power, 12-24VDC supply	0.350	–
DMK 30	**DMK 60**	251 electrical parameters	0.410	0.290
DMK 31	**DMK 61**	251 electrical parameters with programmable outputs	0.480	0.300
DMK 32	**DMK 62**	251 electrical parameters c/w programmable outputs and RS485 isolated	0.490	0.320
DMK 32 D048	–	251 electrical parameters, 24-48VDC supply c/w programmable outputs and RS 485	0.485	–
DMK 40	–	251 electrical parameters, RS232/RS485 isolated, data-logger	0.470	–
ACCESSORIES				
DMK SW		Remote control software for PC-DMK 22/32/40/52/62 c/w cable	0.246	
DMK SW 10		Data-logger software for DMK 40 c/w cables, includes DMK SW	0.400	
51 C2		PC-DMK 40 connecting cable, 1.8m long	0.090	
51 C4		PC-RS232/RS485 converter connecting cable, 1.8m long	0.147	
51 C5		DMK 40-analog modem connecting cable, 1.8m long	0.111	
51 C9		RS232/RS485 converter-analog modem cable for DMK 40, 1.8m long	0.137	
4 PX1		RS232/RS485 converter drive, opto-isolated, 220-240VAC	0.600	
PA96X48		IP65 front protection cover for DMK0... or DMK1...	0.048	
31 PA96X96		IP54 front protection cover for DMK2..., DMK3... or DMK 40	0.077	

Current transformers

DM1T ...

DM2T ...

DM3T ...

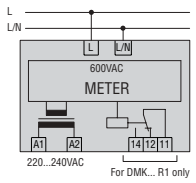
Quantity per package: 1

Order code	Primary current	Burden		Weight [kg]
	/5[A]	Class 0.5 [VA]	Class 1 [VA]	
FOR Ø22mm CABLE				
DM1T 0040	40	—	1	0.200
DM1T 0050	50	—	1	0.200
DM1T 0060	60	—	1	0.200
DM1T 0080	80	1.5	3	0.200
DM1T 0100	100	1.5	3	0.200
DM1T 0150	150	1.5	3	0.200
FOR Ø23mm CABLE, 30x10mm, 25x12.5mm or 20x15mm BUSBAR				
DM2T 0060	60	—	1	0.130
DM2T 0080	80	—	1	0.130
DM2T 0100	100	—	1	0.130
DM2T 0150	150	—	1	0.130
DM2T 0200	200	1.5	3	0.130
DM2T 0250	250	1.5	3	0.130
DM2T 0300	300	1.5	3	0.130
DM2T 0400	400	1.5	3	0.130
FOR 40x10mm, 30x20mm or 25x25mm BUSBAR				
DM3T 0200	200	2	4	0.260
DM3T 0250	250	2.5	5	0.260
DM3T 0300	300	4	6	0.260
DM3T 0400	400	5	8	0.260
DM3T 0500	500	6	10	0.260
DM3T 0600	600	6	12	0.260
DM3T 0800	800	8	15	0.260
DM3T 1000	1000	10	20	0.260

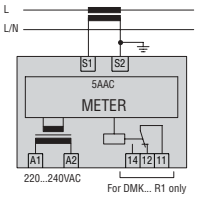
Lovato electric

Wiring diagrams

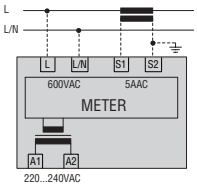
DMK 00 - DMK 00 R1
DMK 80 - DMK 80 R1



DMK 01 - DMK 01 R1
DMK 81 - DMK 81 R1

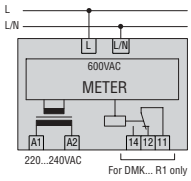


DMK 02
DMK 82

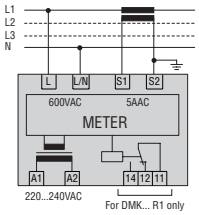


Connect L and L/N when used as voltmeter. Connect S1 and S2 when used as ammeter.

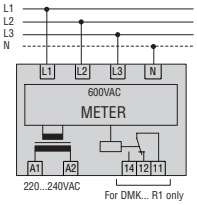
DMK 03 - DMK 03 R1
DMK 83 - DMK 83 R1



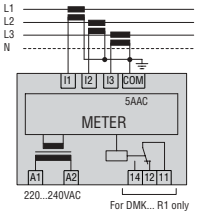
DMK 04 - DMK 04 R1
DMK 84 - DMK 84 R1



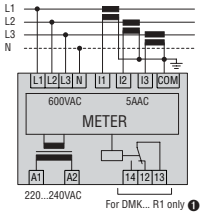
DMK 10 - DMK 10 R1
DMK 70 - DMK 70 R1



DMK 11 - DMK 11 R1
DMK 71 - DMK 71 R1

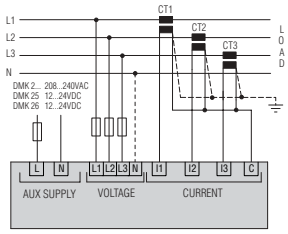


DMK 15 - DMK 15 R1
DMK 75 - DMK 75 R1
DMK 16

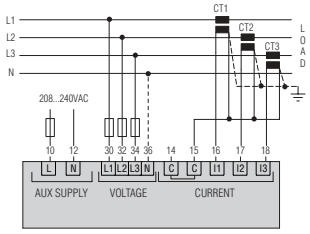


❶ NO contact for DMK 75 R1.

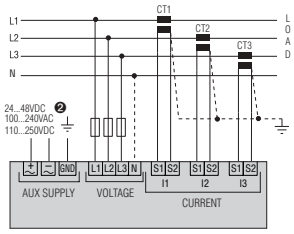
DMK 2...



DMK 5...



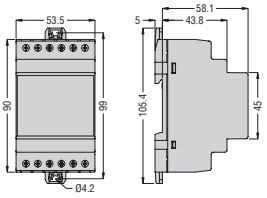
DMK 3... - DMK 40 - DMK 6...



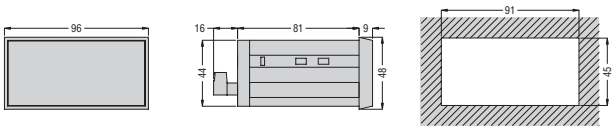
❷ For DMK 32 D048 only.

Dimensions [mm]

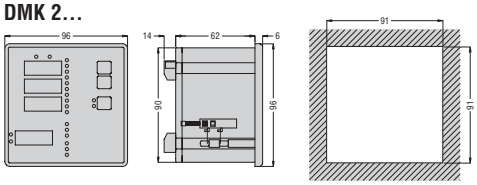
DMK 7... DMK 8...



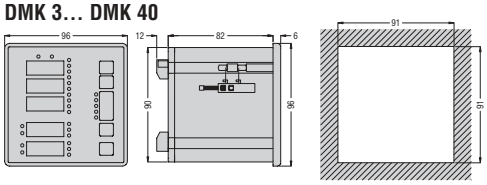
DMK0... - DMK1...



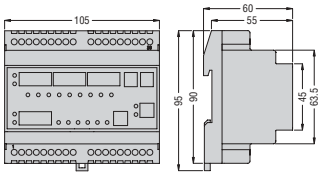
DMK 2...



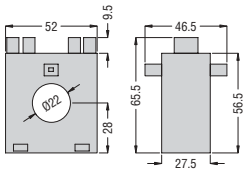
DMK 3... DMK 40



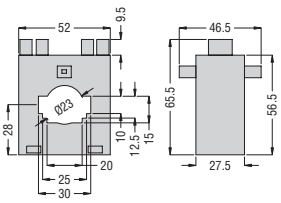
DMK 5... DMK 6...



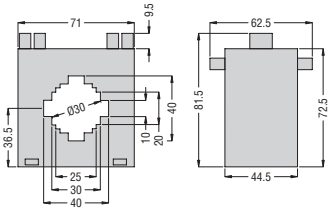
DM1T...



DM2T...



DM3T...



Lovato electric

new
2007

Orange

Contactors

Orange

Electromechanical starters

Prewired limit switches type KP...

Micro switches type KS...

moduLo

LVM series level control relays

moduLo

Voltage relay type PMV10 A440

moduLo

LRD series programmable logic relays

Lovato electric
100% electricity

Planet-SWITCH

- Motor protection circuit breakers
- Switch disconnectors
- Contactors
- Motor protection relays
- Electromechanical starters
- Push buttons and selectors
- Limit, micro and foot switches
- Rotary cam switches

Planet-DIN

- Modular contactors
- Time relays
- Protection relays
- Level control relays
- Earth leakage relays

Planet-LOGIC

- Digital metering instruments and current transformers
- Soft starters
- AC motor drives
- Automatic power factor controllers
- Automatic battery chargers
- Automatic transfer switch controllers
- Programmable logic relays

The products described in this publication are subject to be revised or improved at any moment. Catalogue descriptions and details, such as technical and operational data, drawings, diagrams and instructions, etc., do not have any contractual value. In addition, products should be installed and used by qualified personnel and in compliance with the regulations in force for electrical systems in order to avoid damages and safety hazards.

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