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M-POWER 400 INSTALLATION INSTRUCTIONS

French and Spanish versions of this instruction sheet are available online at www.timken.com/powerlubricators by clicking on either the "G-Power Instruction Sheet" or "M-Power Instruction Sheet" links. To locate the MSDS sheet for this product, visit www.timken.com/powerlubricators and click on the "MSDS" link.

La version en français et en espagnol de cette feuille d'instruction est disponible en ligne à www.timken.com/powerlubricators al cliquant sur les liens "G-Power Instruction Sheet" ou "M-Power Instruction Sheet."

Pour trouver la Fiche signalétique sur ce produit visitez www.timken.com/powerlubricators et cliquez su le lien "MSDS."

Las versiones en francés y español de esta hoja de instrucciones están disponibles en línea en www.timken.com/powerlubricators al hacer clic, bien sea en los enlaces "Hoja de Instrucciónes para G-Power" o en "Hoja de Instrucciónes para M-Power."

Para ubicar la Hoja de Datos de Seguridad sobre Materiales (MSDS) para este producto, vaya a www.timken.com/powerlubricators y haga clic en el enlace "MSDS."

WARNING: Follow installation instructions. Prior to installation, ensure that the unit has a free path to discharge lubricant. Never place near high heat sources or equipment that may produce sparks or flames. Lubricant harmful if swallowed. If ingested, do not induce vomiting and contact a physician immediately. Avoid direct contact with skin. Contents are under pressure. Do not remove or open the device when in operation. Do not take apart or attempt to modify the device except for replacement as directed in installation instructions. Dispose of used devices properly.

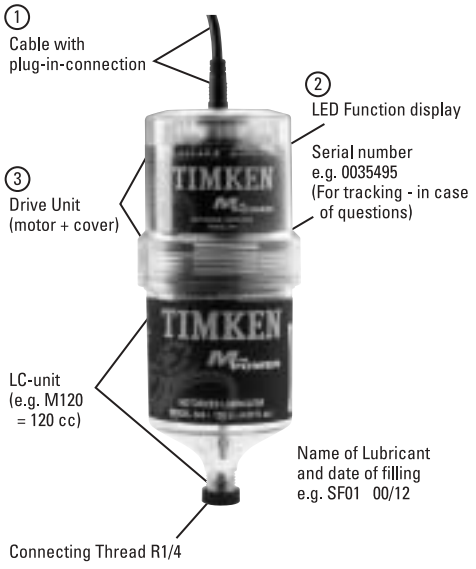
M-Power 400 Product Specifications

GENERAL NOTE FOR THE USER

Before installing and wiring Timken M-Power lubricator, please ensure that there is no transport damage.

Match delivered goods against the packing slip and your order.

These operating instructions must be read carefully and should be stored near where the unit is installed.



MOUNTING ADVICE

Timken M-Power should only be used for the recommended purposes.

Timken M-Power should only be mounted and operated by qualified staff.

Installation must be in accordance with national standards.

Please pay attention to the Material Safety Data Sheets (MSDS) of the lubricants.

MAINTENANCE/CLEANING

Timken M-Power should not be cleaned with any aggressive media. Should cleaning become necessary, we recommend carefully cleaning Timken M-Power with a moist cloth. Please make sure that no moisture enters the lubricator.

TYPE/SYSTEM

Timken M-Power is a programmable, electronic, automatic lubricator with the capability of discharging various types of grease and oils. The unit's ON/OFF function is directly tied to the machine or equipment on which it is installed (when equipment is on, M-Power unit is on — when equipment is off, M-Power unit is off). Each individual unit may be internally set for

various discharge volumes and intervals (based on each 100 hours of machine operation). The unit may also be set to the IMPULSE MODE, allowing the machine to control its own lubrication schedule. The LED display allows monitoring of the operating status of the lubricator. The system consists of a drive unit and a replaceable lubricant cartridge. It is possible to equip Timken M-Power with a lubricant cartridge of 2.03 fl. oz. (60 cc), 4.05 fl. oz. (120 cc), or 8.45 fl. oz. (250 cc).

NOTE: Timken M-Power may be mounted with a support adapter. This support adapter is included.

DRIVE UNIT

The drive unit consists of a robust gear motor which is controlled by an integrated electronic unit.

POWER SUPPLY

Power is supplied by means of a round-plug connection according to DIN 40040 and must be between 7 and 30 V DC max. During normal operation of the machine, the power supply must be turned on for a minimum of 2 minutes to ensure the correct discharge period.

OPERATING PRESSURE

The automatic pressure control of Timken M-Power limits the pressure to 75 PSI (5 bar). At this maximum pressure, the unit will attempt several times (up to 9 times) to overcome this pressure. If pressure cannot be overcome, the unit will automatically shut off to protect itself.

DISCHARGE VOLUME OF LUBE CARTRIDGE-UNITS

Three different sizes of lube cartridges are available:

fl.oz.	cc	Lube Cartridge
2.03	60	402
4.05	120	404
8.45	250	408

WEIGHT WITH DRIVE UNIT

Lube Cartridge		Empty
60cc	10 oz.	11.6 oz.
120cc	10.3 oz.	13.8 oz.
250cc	11.6 oz.	19 oz.

DISCHARGE VOLUME

ADJUSTING TYPE OF DISCHARGE

The drive unit has a circuit board with dip switches. These are used to select the type of discharge.

TABLE OF DISCHARGE

Amount of discharge in cc (1 cc = approx. 0.9 g lubricant)

per 100 operating hours / **per impulse**
Dip switch "VOL"

Dip switch "TIME"	60 cc (S60)	120 cc (M120)	250 cc (L250)	Impulse Mode
A	8.33	16.67	34.72	2.11
B	2.78	5.56	11.57	1.06
C	1.39	2.78	5.79	0.53
D	0.69	1.39	2.89	0.26

Impulse Mode:
refer to page 6, "Impulse Mode"

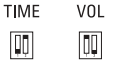
NOTE: Impulse Mode is only possible with 4.05 fl. oz. lube cartridge.

Examples for determining proper dip-switch settings to achieve optimal lubrication in the "normal mode" (per 100 operating hours):

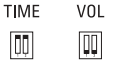
Example 1:

A roller bearing is to be provided with 14 cc of lubricant every 500 hours of operation: 14 cc ÷ 500 h = 0.028cc per h = 2.8 cc per 100 h
The discharge table above shows that 3 different settings are possible for each lubricant cartridge size.

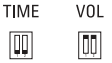
Variation I:
2.78 cc/100 h for a
60 cc LC-unit



Variation II:
2.78 cc/100 h for a
120 cc LC-unit



Variation III:
2.89 cc/100 h for a
250 cc LC-unit



At this point, you can calculate the total discharge life of the lube cartridge (and the exchange date). Processed as following:

The roller bearing to be lubricated is installed in a machine which runs 5 days per week 8 hours per day.

To Variation I: 60cc Lube Cartridge
2.78 cc/100 h = 0.0278 cc/h
60 cc ÷ 0.0278 cc/h = 2158.3 h
2158.3 h ÷ 40 h/week = 54 weeks

The lubricant is sufficient for more than 1 year, not including additional operational breaks or any other machine standstills.

To Variation II: 120cc Lube Cartridge
2.78 cc/100h = 0.0278 cc/h
120 cc ÷ 0.0278 cc/h = 4316.5 h
4316.5 h ÷ 40 h/week = 216 weeks

The lubricant is sufficient for more than 2 years, not including additional operational breaks or any other machine standstills.

To Variation III: 250 cc Lube Cartridge
2.89 cc/100h = 0.0289 cc/h
250 cc ÷ 0.0289 cc/h = 8650.5 h
8650.5 h ÷ 40 h/week = 216 weeks

The lubricant is sufficient for longer than 4 years. Due to the stability of each individual lubricant we recommend Variation I with a 60 cc lubricant cartridge.

Example 2:

Given the same machine as in example 1, but with different and irregular running times, e.g., 4 hours on day one, 2 hours on day two, not running on days three and four, and 3 hours on day five.

You can determine the dip switch setting as in example 1, but the total discharge life of the lubricant cartridge and exchange date cannot be determined. It is possible to monitor the unit by observing the LED or PLC.

Particular attention should be paid to these lubrication points since, in this scenario, the lubricator could possibly be installed for longer periods than our recommendations (shelf life of grease).

IMPULSE MODE (ONLY WITH 120 CC LUBRICANT CARTRIDGE)

As soon as power (7-30 V DC max.) is supplied, Timken M-Power will discharge the set amount. To get another discharge cycle, the power must be interrupted for at least 5 seconds and then supplied again.

NOTE: In certain situations, there may not be a constant power supply. In these situations it is imperative that the power be supplied for at least 2 minutes to guarantee a full discharge.

Amount of discharge in cc (1 cc = approx. 0.9 g lubricant)

Per Impulse
Dip switch "VOL"

Dip switch "TIME"	Impulse Mode
A	2.11
B	1.06
C	0.53
D	0.26

■ APPLICATION TEMPERATURES

Temp. Range: 14˚ F to 122˚ F (-10˚ C to +50˚ C)

Within this range of temperature and an internal pressure not exceeding max. 5 bar, a constant discharge is guaranteed.

Temp. exceeding 122˚ F (+50˚ C) will reduce the pressure stability due to diminishing stability of plastic parts. Temperatures below 14˚ F (-10˚ C) will impair functioning.

NOTE: Tests have shown that extended periods of 14˚ F/-10˚ C may also impair the function.

SHELF LIFE

The lubricant cartridge can be used for up to two years after date of filling. The date of filling is stated on each lubricant cartridge in the following way: 99/26. The code determines year/calendar week.

The drive unit is designed to be reused when installed and operated in accordance with the operating instructions. The empty lubricant cartridge is not refillable.

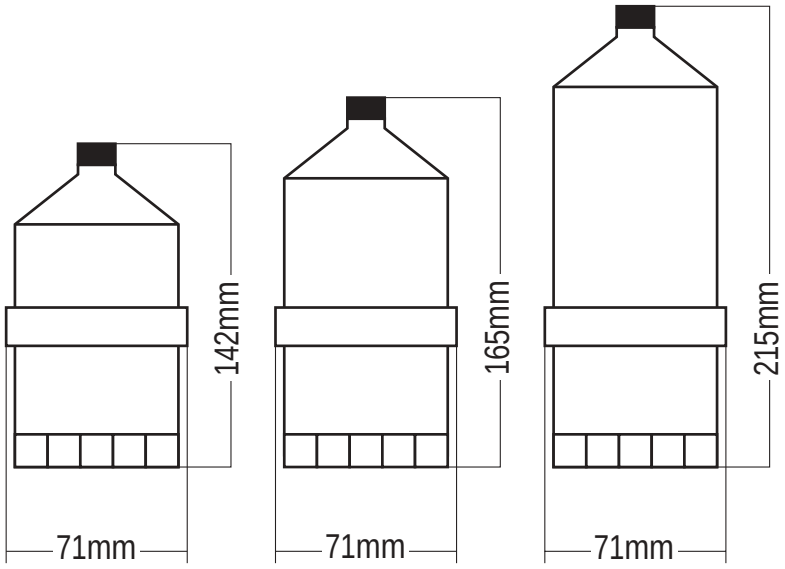
STORAGE REQUIREMENTS

Store lubricant cartridge and drive systems in a dry location. Recommended temp.: 68° F +/- 10° F (20° C +/- 5° C)

Shelf Life:	Lube cartridge	1 Year
	Drive unit	Unlimited

Please note that we do not accept liability for warranty claims due to improper handling and storage by the user or damage due to transport.

DIMENSIONS



with 2.03 fl. oz. LC-unit | with 4.06 fl. oz. LC-unit | with 8.45 fl. oz. LC-unit

FIELDS OF APPLICATION

Timken M-Power is intended where lubrication is to take place only while the machine is running and where a status report back to the machine is desired.

Timken M-Power may be used to lubricate roller and sliding bearings, drive and conveyor chains, guideways and open gears.

Timken M-Power should only be used for the recommended purpose.

DEGREE OF PROTECTION

IP degree of protection:	IP 65 (dust tight and protected against waterjets)
Permit:	CE

DISPOSAL

- Return the empty lube cartridge to your local supplier for recycling, or you may dispose of the lube cartridge along with oil- and grease-containing substances.
- The drive unit is reusable.
- Please follow the waste disposal regulations in your area if you dispose of Timken M-Power yourself.

APPLICATION OF TIMKEN M-POWER

■ INITIAL INSTALLATION

PREPARATION

Before initial installation of the lubricator, the lubrication points and any extensions must be adequately pre-lubricated with the same lubricant that is contained in Timken M-Power. For this purpose, we offer a 400g lubrication cartridge for grease guns.

APPLICATION

Connect the cable to the wiring board according to the instructions provided in the table “Electronic Control” on page 8. Only authorized, qualified persons should carry out cable connections. Installation must be carried out according to national regulations (e.g. IEC). A standard five-meter cable is available.

Unscrew the lid of the drive unit and adjust the “TIME” and “VOL” switches according to your calculations. Replace/close the lid and screw Timken M-Power into the lubrication point. Plug the cable into the connector socket of Timken M-Power. Specially designed accessories are available for mounting Timken M-Power. For mechanical protection the support adapter is recommended.

■ CHANGING THE DISCHARGE VOLUME AFTER THE M-POWER CONTROL HAS BEEN IN OPERATION/RESET FUNCTION

It is possible that after the M-Power has been in operation you may need to change the set discharge amount. There may be different reasons, e.g., wrong calculation of discharge amount.

Solution: Change dip switch “VOL” to position shown below = manual reset of processor. Proceed as follows:

- Unplug the power connector from the lubricator.
- Unscrew the lubricator from the lubrication point.
- Unscrew the lube cartridge from the drive unit.
- Set the dip switch “VOL” to this position pictured at right.
- Locate the white peg on the bottom of the drive unit – push it in and hold.
- Attach the power connector to the drive unit.
- As soon as the motor runs, release the white peg and unplug the power connector.
- Set the dip switch “TIME” and “VOL” to the desired position.
- Again, push and hold the white peg on the bottom of the drive unit.
- Attach the power connector to the drive unit.
- After three seconds, release the peg and unplug the power connector.
- Mount the drive as described under point three.

NOTICE: Changing the discharge volume as described above may result in an incorrect LED display of “lubricant cartridge empty,” which depends on how empty the attached lubricant cartridge was before the discharge volume was changed. Therefore it is important that you manually monitor the end of discharge period.

■ CHANGING THE LUBRICANT CARTRIDGE AND RESTARTING

A steady green/red signal indicates an empty lubricant cartridge. You now have the opportunity to re-adjust the type of discharge.

Ensure that the lubricant cartridge is changed in a dry place so that no moisture and humidity enters Timken M-Power.

Follow steps below:

- disconnect plug from M-Power
- unscrew M-Power from lubrication point
- unscrew lid
- remove drive unit from empty lubricant cartridge
- place drive unit onto new lubricant cartridge
- at this point you may re-adjust the discharge period according to chart “discharge volume”
- place lid over drive unit
- manually screw lid on hand tight – lid and lubricant cartridge must fit flush (refer to drawing below)
- remove plug from new lubricant cartridge
- screw M-Power back into lubrication point
- reconnect cable

Follow all points exactly as per the instructions, otherwise correct discharge cannot be guaranteed.

PERFORMANCE INDICATOR / POWER SUPPLY

VISUAL CONTROL

Timken M-Power is equipped with an LED display

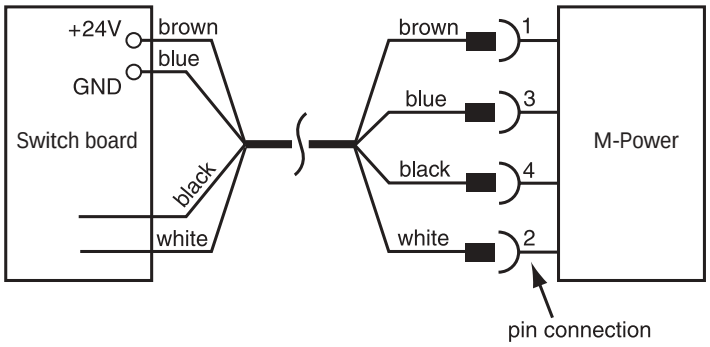
Steady green signal:	OK, “system functions”
Steady red signal:	error, malfunction
Steady green + red signal:	lubricant cartridge is empty and needs to be replaced
Steady red signal (with motor run):	lubricant being discharged

ELECTRONIC CONTROL

The signals for operating status: “Timken M-Power works,” “discharge in progress,” “malfunctions,” and “lube cartridge empty” can be processed as LED voltage signals at the connection cable (load capacity max. 10 mA) via PLC.

The power supply must be between 7 – 25 V DC = (update: 30 V DC = max.).

Connector Pin Assignment	Color of Cable	Signal
1	brown	power supply +
2	white	LED green digital
3	blue	power supply –
4	black	LED red digital



Current Consumption (A) at (24 Volt)	Min.	Typical	Max.
68˚F / +20˚C without counter pressure	0.15	0.2	0.5 A
122˚F / +50˚C without counter pressure	0.15	0.2	0.5 A
41˚F / +5˚C without counter pressure	0.4	0.8	1.5 A
41˚F / +5˚C, (75 PSI / 5 bar) counter pressure	0.4	1.0	1.8 A

Starting motors could result in a power surge raising the current up to two to three times higher than the rated current. Therefore it is essential to use slow-blowing fuses in the power supply or along the current path.

Take this point into consideration when checking the power supply and use a power supply of appropriate dimensions.

Several Timken M-Powers Installed within One System (Controlled by PLC)

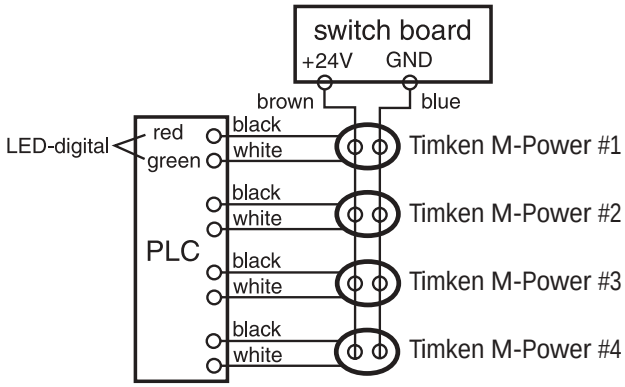
Power Supply

Each Timken M-Power must be directly connected to the full voltage supply (parallel connection).

Function Display (LED)

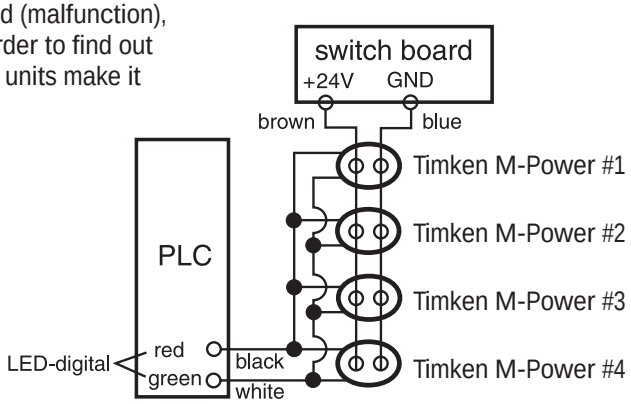
-Direct connection to PLC

Each Timken M-Power will be analyzed separately.



- Multi-display of several Timken M-Power units to PLC (parallel connection)

When the LED displays red/green (lubricant cartridge empty) or red (malfunction), then each lubricator must be checked at the lubrication point in order to find out the reason for the signal. (Parallel connection of Timken M-Power units make it impossible to individually analyze them.)



The PLC should be programmed so that the motor run will not cause any malfunction display or empty display. Sample applications of Timken M-Power may be obtained at your local supplier.

Troubleshooting Guide

Malfunctions	Possible Cause	Solution
Unit does not function	- wrong cable connection	- connect cable accord. to connector assign. - check connector assignment
	- break in cable	- check voltage at connector pin - attach new cable
	- no power supply	- check power supply - too many units connected
	- relay defect in machine	- change relays
Unit signals “system at work” (green LED), although lubricant cartridge is empty		- replace with full lubricant cartridge

Malfunctions	Possible Cause	Solution
Unit signals “system malfunctions” (red LED)	- clogged tube and/or connection parts - counter press. too high	- clean tube and connecting parts, shut off and restart
Unit discharges too fast	- wrong setting of “VOL” - wrong setting of “TIME”	- correct switch setting
Unit signals “end of discharge” (red & green LED), although the unit is empty		- replace with full lubricant cartridge
Unit does not discharge correct amount	- changing of the switch; setting was done wrong	- correct switch setting

INCORRECT COMBINATION OF TIME/VOLUME/LUBRICANT CARTRIDGE

The volume switch is set for a 120 cc lubricant cartridge; however, a 250 cc lubricant cartridge is mounted. As a result, only half of the lubricant cartridge will empty. Because of the switch setting, the empty signal is being electronically activated at 120 cc and ends the discharge. In this case, the M-Power will only discharge 120 cc for which it was set. This will cause lack of lubrication.

If the “VOL”-switch position does not match the actual size of the lubricant cartridge, complications and false signals will occur.

CAPTURE OF THE PISTON POSITION

The system electronics store the piston position in memory to indicate that the lubricant cartridge is empty. If the lubricant cartridge is replaced before complete discharge has taken place, the electronics may be disturbed. This may have various consequences.

Case A: *An almost empty lubricant cartridge is replaced by a partially filled one.* The new lubricant cartridge discharges only for the discharge time that was left over by the original lubricant cartridge. Timken M-Power shuts off automatically and signals "end of discharge". The new lubricant cartridge will not be completely emptied.

Case B: *A partially filled lubricant cartridge is being replaced by an almost empty lubricant cartridge.* The new lubricant cartridge will discharge to empty. Timken M-Power, however, runs for the length of the time the original lubricant cartridge would have needed and signals "system at work," even though the lubricant cartridge is already empty.

If a lubricant cartridge is replaced, a new, completely filled lubricant cartridge must be used.

Data Sheet of the Power-Supply Cable

CABLE-CONSTRUCTION

Conductor cross-sectional dimensions:	4 x 0.25 mm2
Flexible cord construction:	CU flex 32 x Ø 0.1 mm blk
Insulation:	PVC Ø 1.3 + 0.05, wall thickness about 0.32 mm
Cable covering:	Color: black
Material cable covering:	PUR
Wire:	Color: brown, white, blue, black
Cable length:	16 feet (5 meters) (standard)

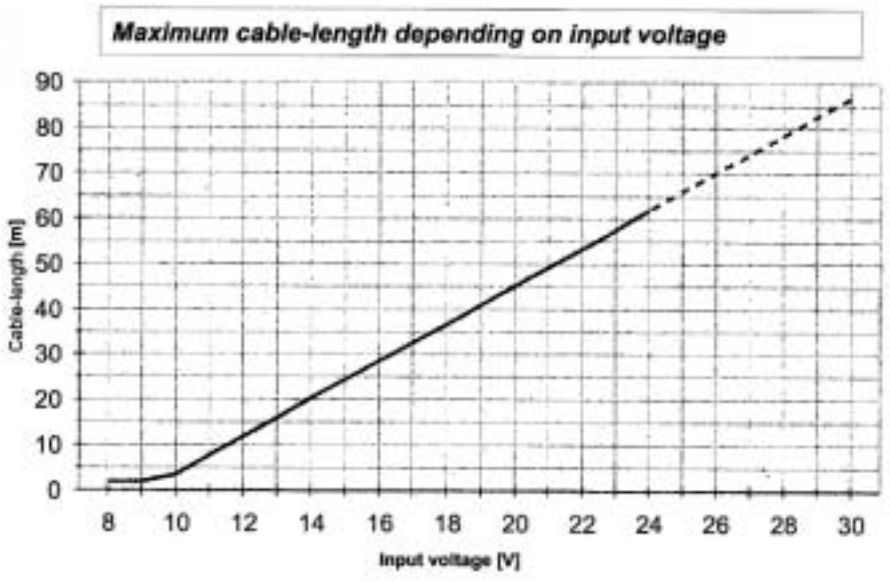
ELECTRICAL VALUE:

Operating Voltage:	< = 900 V peak value
Testing Voltage:	> = 2500 V pp
Line Resistance:	79.9 ohm/km at 20˚ C

MECHANICAL VALUES:

Safe temperature:	static condition:	-13˚ F up to 158˚ F (-25˚ C up to +70˚ C)
	dynamic condition:	23˚ F up to 158˚ F (-5˚ C up to +70˚ C)
Weight:	abt. 27.9 kg/km	

Cable is drag-chain qualified, approved for the smallest bending radius 10 x D.
Maximum cable-length: please refer to the chart at right.



Technical Data Sheet for Motorized Lubricator Control

Circuit Board Version:	EJØ
Power Supply:	7 to 30 V DC=max) 5% ripple
Drive Motor:	4V DC Motor
Current Consumption:	0.2 A…. 1.5 A Maximum motor stand-still current Short term 2.0 A
Working Temperature:	14˚ F up to 122˚ F (-10˚ C up to +50˚ C)
Protection Class:	IP65 (dust tight and protected against water jets)
Permit:	CE
Weight:	All weights in oz. +/- .32 (+/- 10g)
Drive with cover:	7.72oz. (240g)

Lubricant cartridge -units filled with grease		**Complete weight (drive, cover, lubricant cartridge)**
Lube cartridge 402	3.9 oz.	11.6 oz.
Lube cartridge 404	6.1 oz.	13.8 oz.
Lube cartridge 408	11.6 oz.	19 oz.

Complete dimensions:	with lube cartridge:	Ø 71 mm x 142 mm
	with lube cartridge:	Ø 71 mm x 165 mm
	with lube cartridge:	Ø 71 mm x 215 mm

SERVICE TIP

You have the option to return the empty Timken M-Power to us. We will change the lubricant cartridge and adjust the discharge to your specification. We will dispose of the used parts in an environmentally safe manner or energetically recycled.

SAFETY INFORMATION

Danger	**Avoiding Danger**
- spilled lubricant on the floor may cause slipping	- remove spilled lubricant from floor at once
- skin contact or ingesting lubricant may cause damage	- refer to safety data sheet to one's health

INFORMATION

If you have questions concerning Timken M-Power, please contact your local supplier or call (800) 223-1954.

Safety Warnings

In addition to observing warnings on the product and in the operating instructions, be sure to observe the following precautions for the use, handling and storage of this device. **Warning: Proper maintenance and handling practices are critical. Failure to follow installation instructions and to maintain proper lubrication can result in equipment failure, creating a risk of serious bodily harm.**

- Retain the product's safety and operating instructions for future reference. Follow all operating and usage instructions. Consult the latest material safety data sheet (MSDS) for any lubricant before using, handling or storing this device.
- Do not remove or open the M-Power device when in operation. All M-Power devices utilize pressure to deliver lubricant to the application. Removing the device while the contents are under pressure can cause damage to the unit and may result in severe bodily injury.
- Ensure that the unit has a free path to discharge its lubricant and is not subject to excessive heat.
- Do not use this product near heaters, radiators, furnaces or other pieces of equipment that may produce sparks, flames, or high heat.
- Electromechanical units contain a manufacturer supplied batter pack. Do not attempt to recharge the battery pack, disassemble it, immerse it in water or dispose of it in fire. Do not attempt to replace the batteries with any other than replacement battery packs available from Timken.
- Do not take apart any gas-pressurized unit. Do not take apart any electromechanical device except for replacement of the battery pack or lubricant refill pack. Do not crush, puncture or incinerate the battery pack or short the metal contacts. In addition, do not attempt to open or service the battery pack or lubricant refill packs as doing so may release harmful chemicals.
- Only use Timken-certified attachments and accessories to connect the M-Power device to the equipment application. Failure to do so may damage the device and the equipment and may result in bodily injury or damage to the equipment.
- Always check the suitability of any lubricant with the manufacturer of the equipment to be lubricated prior to use. A wide variety of lubricant oils and greases are available for this secure-lube device depending on the equipment to be lubricated.
- Avoid direct contact of lubricant with skin. Do not swallow or ingest the lubricant. If ingested or swallowed, call a physician or Poison Control center for most current instructions. If professional advice is not available, do not induce vomiting.
- "Empty" devices retain some lubricant in liquid and/or vapor form. Do not pressurize, mechanically modify or expose used devices to heat, flame or static electricity. They may cause serious bodily harm. Do not attempt to clean or refill the devices because the lubricant is difficult to remove. "Empty" devices should be disposed of in an environmentally safe manner, in accordance with governmental regulations.

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