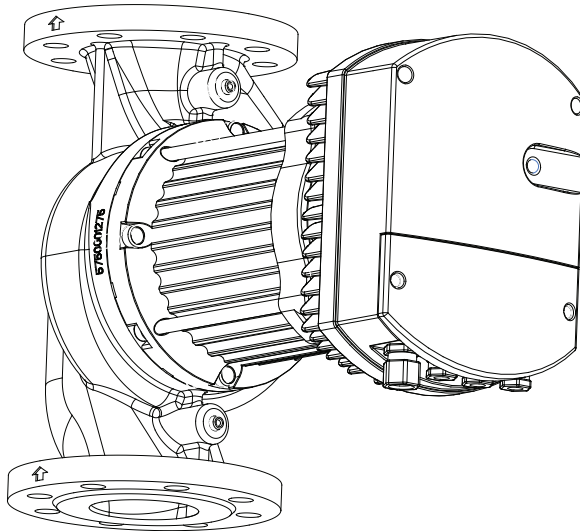# IMPPUMPS
Inteligent Motor Pumps

NMT(D) 40, 50, 65, 80, 100

SLO	**NAVODILA ZA VGRADNJO IN UPORABO**
GB	**INSTALLATION AND OPERATING MANUAL**
D	**MONTAGE- UND BETRIEBSANLEITUNG**
I	**ISTRUZIONI PER L'INSTALLAZIONE E L'USO**
PL	**NMT(D) INSTRUKCJA MONTAŻU I OBSŁUGI**
TR	**MONTAJ VE KULLANIM KILAVUZU**

	EU directive	Harmonized standard
Compliance of the product with EU standards	Machinery 2006/42/EC	EN 809
	Low Voltage 2006/95/EC	EN 60335-1 EN 60335-2-51
	Electromagnetic compatibility (EMC) 2004/108/EC	EN 55014-1; EN 55014-2 EN 61000-3-2; EN 61000-3-3
	Ecodesign Directive (2009/125/EC) Circulators: Commission Regulation No. 641/2009.	EN 16297-1:2012 and EN 16297-2:2012

Pump type	EEI
NMT 40	EEI≤0,27 –Part 2
NMT 50	EEI≤0,26 –Part 2
NMT 65	EEI≤0,25 –Part 2
NMT 80	EEI≤0,23 –Part 2
NMT 100	EEI≤0,23 –Part 2

IMPPUMPS
Inteligent Motor Pumps

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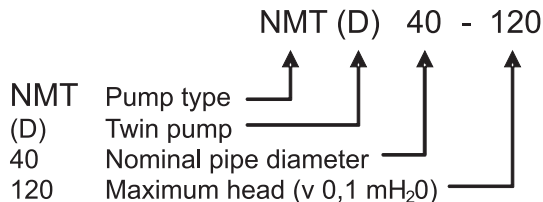www.imp-pumps.com

CONTENTS

GB

1. GENERAL INFORMATION

1.1 USES

The circulating pumps of the mentioned types are used for the transfer of liquid media within the system of hot-water heating, air-conditioning and ventilation. They are designed as single or twin variable-speed pumping aggregates where the speed is regulated by electronic device. They are to be used with pure water or glycol/water mixture.

1.2 TECHNICAL DATA

1.2.1 PUMP LABELING

$$\text{NMT (D)} \quad 40 \quad - \quad 120$$

NMT   Pump type
(D)   Twin pump
40   Nominal pipe diameter
120   Maximum head (v 0,1 mH$_2$0)

1.2.2 CONNECTION AND ELECTRICAL DATA

Power ratings				
	NMT 40	NMT 50	NMT 65	NMT80/100
Rated voltage (U)	230V AC ±15%, 47-63Hz Pumps can operate at reduced voltage with limited power P=Imax*U.			
Rated power (P)	500W	800W	1100W	1600W
Rated current	2.2A	3.5A	4.8A	7.0A
Current limit (Imax)	6A		8A	
Startup	Built-in startup circuit.			

Standards and protection	
Protection class	IP44
Insulation class	180 (H)
Motor protection	Thermal - built in
Medium temperature	-10°C do 110°C
Ambient temperature	0°C do 40°C[1]
Water quality	VDI 2035
Rated pressure	6/10 bar
EMC (89/336 EEC)	EN 61000
LVD (73/23/EC)	EN 60335-1 EN 60335-2-51
Machine safety (98/37/EC)	EN ISO 12100

[1] Ambient temperature should be 25°C or lower when medium exceeds 80°C.

2. SAFETY

These instructions should be studied carefully before installing or operating the pump. They are meant to help you with installation use and maintenance and to increase your safety. Installation should only be performed with regards to local standards and directives. Only qualified personnel should maintain and service these products.

2.1 DANGER SYMBOLS

Safety precautions which, if ignored, could cause personal injury are indicated by the symbol above:

Precautions that are necessary to adhere to avoid machinery damage carry:

ATTENTION!!!

Tips that could ease pump handling are marked with:

2.2 RISKS

Failure to comply with safety precautions could cause personal injury or machinery damage and loss of right to refund. Safety functions are only guaranteed if the pump is installed, used and maintained as described in this manual.

3. PUMP DESCRIPTION

Electronically commutated regulated NMT pumps consist of two main parts centrifugal pump of appropriate head and electronic regulator. Hydraulic part is hermetically sealed from motor assembly and has no moving seals. NMT pumps are powered by ECM permanent magnet motor that does not consume any energy to magnetize the rotor and so provides high energy efficiency. ECM motor is run by frequency converter with integrated PFC (Power Factor Correction) filter. Converter estimates current flow and head from the motor loading. That information is essential for differential pressure control.

3.1 REGULATION MODES

Various regulation parameters (desired head, supply power, rpm limit) will reduce the head until the pump achieves desired response.
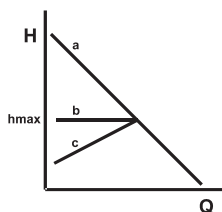
3.1.1 Differential pressure regulation (ΔP)

Fig. 1

Unregulated pump decreases head with increasing flow (*Fig. 1*, *curve a*). Typical system with thermostatic valves increases the head when the valves are closed and hot water flow is not needed. Electronic regulation can provide constant head by modifying power input (*Fig. 1*, *curve b*). Additional energy savings and noise reduction are achieved with proportional head regulation that also compensates for pressure drop in the pipes (*Fig. 1, curve c*). Pump is factory set to operate in this mode. »Qprop« factor provides user adjustable curve slope. Qprop of 0% means that the head does not exhibit any dependence to flow. Qprop set to 60% means that the pressure will drop for 60% from set value when there is no flow. For example if the head is set to 5m, the pump will only provide 2m when the valves are closed.

 Substantial percentage of glycol in the mixture can influence regulation.

3.1.2 RPM regulation

Provide regulation similar to manually adjustable pump.

3.1.3 Power limitation

Artificially limit power consumption and output.

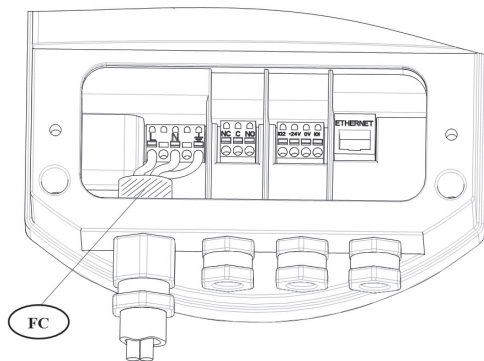### *3.2 Electrical connections*

Connection box layout:

Fig. 2

Connection functions (*Fig. 2*)	
Markings	*Descriptions*
L	230V AC, electricity power supply.
N	
PE	Safety ground.
FC	Ferrite core for HF interference compliance. PE, L and N wires should be lead thru it. (Part is in the package with cable glands).
NC	Normally closed relay contact.
C	Common relay lead.
NO	Normally closed relay lead.
IO2	Digital input 2.
24V	+24V@100mA max.
GND	Digital input common return.
IO1	Digital input 1.
ETHERNET	Ethernet connection.

The pump has a built-in over current fuse and protection, temperature protection and basic overvoltage protection. It does not need additional thermal protection switch. Connection leads should be capable of carrying rated power and properly fused. Ground lead connection is essential for safety. It should be connected first. Grounding is only meant for pump safety. Pipes should be grounded separately.

4.   PUMP INSTALLATION

4.1   INSTALLATION INTO PIPE LINES

Pump is protected with a double box during transport. It can be lifted from the box with internal handles or by lifting it by the heat sink.

  Pumps might be heavy. Provide yourself help if needed.

Pumps are designed to be built in connecting flanges. Use all screws. The connecting flanges are designed for nominal pressure PN 6/10.

Ambient and medium permissible temperatures

Ambient temperature [C°]	Maximum medium temperature [C°]
do 25	110
30	100
40	90

For pump to operate with minimal vibrations and noise it should be installed:
- into the pipelines with axis (1-1) in horizontal position:
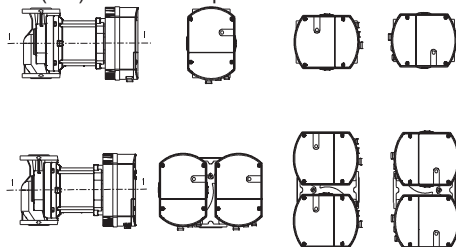

Fig. 3

- pipes should be without curves for at least 5-10 D (D = rated pipe diameter) from the flanges.

⚠️ Pump must not be used in the safety pipelines.

| ATTENTION!!! | Pump should not be used as a holder during welding! |

Desired head orientation can be achieved by rotating pump head. Pump is mounted to hydraulic casting with four screws. By unscrewing those head can be turned.

| ATTENTION!!! | When reassembling, care should be taken to ensure seal fit. Failing that, water could cause damage to pump internals. |

Ambient should be dry and illuminated as appropriate. Pump seals prevent dust and particles from entering as prescribed by IP class. Make sure that the distribution box cover is mounted and that cable glands are sealing.

Pump will provide the longest lifetime with ambient at room temperature and moderate medium temperature. Prolonged operation at elevated temperatures could increase wear. Aging is accelerated by high power and high temperatures.

| ATTENTION!!! | Pump head and drains between hydraulic castings and motor housing should not be thermally insulated as insulation could interfere with cooling and condense drainage. |

⚠️ Hot medium can cause burns! The motor can also reach temperatures that could cause injury.

4.2 CONNECTION TO POWER AND SIGNAL LINES

Chapters »Electrical connections« and »Communication and control« contain detailed information about electrical connections.

4.3 CONNECTION TO NETWORK

In order to use various web tools, pump should be connected to network or a personal computer over Ethernet plug. User CAT-4 or better network cable connected to "PATCH" configuration if plugged into a network or wired as "CROSSOVER" for connection to PC.

To achieve pump IP protection, network cable should be lead over the inlet and then crimped to a connector. Ethernet plug is galvanicaly insulated, but the rest of the cabling could still present shock hazard. All connections should be made with the power turned off.

If more than one pump will be connected into network, each individual pump should have its IP address and NetBIOS name changed and noted. That will prevent network collisions and provide naming service in relation to pump function.

5. COMMUNICATION AND CONTROL

5.1 CONTROL LIGHT

Control light on the front panel provides fast overview over pump operation. Blue color signalizes correct operation while red indicates an error.

Blue light	
Blinking	Pump is in standby and not pumping water.
On	Pump is operating as set.

Red light indicates error by blinking error codes. Sequence of blinks is interrupted by a pause. The number of blinks between two pauses is the error code.

Red light	
Error code	Description
1	Motor is lightly loaded. This indicates that the pump is probably running dry – *fill the system (might need unairing)*
2	Pump can not start. Rotor might be blocked – *remove head of pump and check if the rotor turns freely between hydraulic ceiling and stator*
3	Motor has overheated – *too hot medium, over isolated head of pump or non-functioning motor*
4	Frequency converter error – *pump has or will have error – call professional*
5	Stator or rotor faulty – *call professional*

If the pump is unresponsive, disconnect and connect it back to the electrical grid.

5.2 DIGITAL INPUTS

Electrical properties	
Maximum input voltage	32V DC
Input impedance	~5kΩ
Logical »1« voltage	>8V
Logical »0« voltage	<2V
Insulation	To supply voltage: 4kV@1s, 275V permanent.

Default function	
I1	»RUN«. Integrated pull-up resistor. Pump stops when input is connected to 0V.
I2	»MAX«. Pump will start to operate with maximum power if logical "1" (24V) is detected.

5.3 24V SUPPLY

Output is meant for automation elements.

Electrical properties	
Maximum current	up to 100mA
Output voltage	24V ±20%
Output ripple	under 1V

ATTENTION!!! Misconnection or overload could cause pump shutdown or even permanent damage.

5.4 RELAY OUTPUT

Relay output	
Rated current	8A
Maximum voltage	250VAC 48VDC
Maximum load	up to 500VA
Default function	ALARM »error«

5.5 ETHERNET

Specifications	
Connector	RJ-45
Speed	BASE-10, 10Mbit/s
Galvanic insulation	To digital inputs: 1.5kV@1s, 48V permanent
	To line voltage: 4kV@1s, 275V permanent
Connection	TCP/IP
Services	http server and client, FTP server
Web language	HTML 1.1

5.5.1 SEARCH OF A "LOST" PUMP

If you have forgotten IP address or NetBIOS name or if you accidently set it to an incorrect value, pump can still be found with network analyzers. Freware tools like »WireShark« or »EtherDetect« can help you to trace the pump as it periodically tries to contact its twin. This is true even in the case of single pump. You can trace out the device that sends out requests and contact it directly.

5.6 PUMP SETTINGS

5.6.1 FACTORY DEFAULTS

Pumps are set to provide 7m of head with proportional pressure regulation. These settings will provide energy efficiency. If factory settings are not suitable they can be modified over Ethernet connector and Web interface. Default IP address is 192.168.0.245 and default NetBIOS name is »nmtpump«.

Pump can be brought to standby or maximum power via digital inputs.

5.6.2 WEB INTERFACE SETTINGS

When the pump is connected to network or another computer, it can be reached by typing its IP address or NetBIOS name into browser's address line. Default IP address is 192.168.0.245 and default NetBIOS name is »nmtpump«.
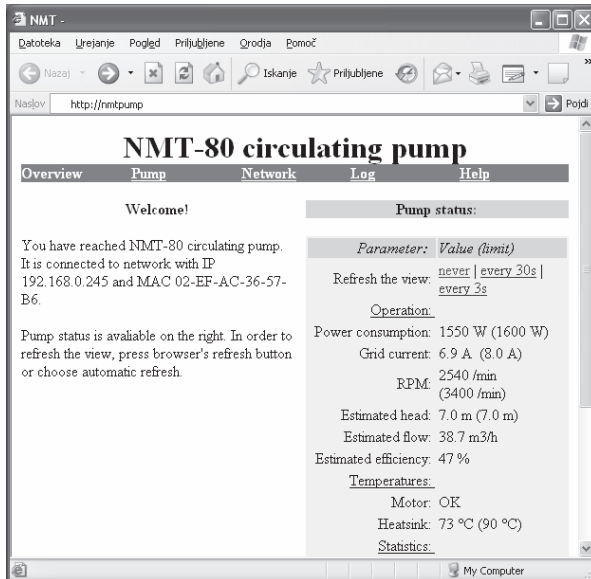
Fig. 4

5.6.2.1 OVERVIEW

(web page OVERVIEW)
Displays pump operation summary, like:

- Power consumption,
- Grid current,
- RPM,
- Estimated head,
- Estimated flow,

- Estimated efficiency,
- Motor status,
- Heatsink temperature,
- Statistics,
- Remote control.

5.6.2.2 PUMP SETTINGS

(Web page PUMP)
Page is meant to provide regulation settings.

- "Limit head to" will set maximum allowable head.
- "Hmax proportional to Q" will set the ratio between head and flow.
    - o Hmax = 0%: constant pressure is set and should not exhibit noticeable change until maximum power is reached.
    - o Hmax = X%: parameter will set the percentage of drop in head from maximum to closed valve.
- "Limit rpm to": will limit motor speed
- "Limit power to",
- "Limit grid current to",
- "Limit heatsink temperature to".
- Switch on the relay when:
    - o 0: no function.
    - o OPERATION: pump ready to operate.
    - o RUN: pump operating.
    - o ERROR: error detected.
- Input I1 is:
    - o 0: no function.
    - o DUPLEX: twin connection.
    - o RUN: remote start.
    - o MAX: maximum head.
    - o EXTERNAL: external pressure switch.
    - o Input I2 has functions the same as I1.

- SAVE: will write settings in permanent memory,
- TEST: Will use settings but will not save them. Restart will restore previous settings as will pressing »RESTORE« button.

5.6.2.3 NETWORK SETTINGS

(Web page NETWORK): Provides a way to change network configuration.
Buttons operate in a similar manner as on previous page.

5.6.2.4 LOG

(Web page LOG)
Page will display possible errors and some unusual events.

5.6.2.5 Help

(Web page HELP) will redirect you to www.imp-pumps.com Possible software upgrades and manuals will be available.

6. Maintenance and spare parts

NMT pumps are designed to operate without maintenance for several years. Spare parts will be available for at least 7 years from the warranty period expiration.

7. Twin pump (NMTD)

7.1 Operation

The main purpose of the twin pump is uninterrupted operation when one of the pump fails. Common hydraulic housing is equipped with a change-over flap and two pump heads, separately connected to grid. Pumps are interconnected with a network cable. During normal operation, only one pump is active, while the other is in standby. Pumps change duty once per day. Every pump operates according to its own settings, so parameter changes should be made on both pumps. If any pump detects an error (red light is blinking) or loss of communication, the standby pump will start in less than 15 seconds.

7.2 Network connection

Both pumps are interconnected with a cross-over network cable. If you wish to connect the pumps to a local network, replace the network cable with two connections to the nearest network switch. The left pump has the same network settings as an individual pump. NetBIOS name is »nmtpump« and IP address is 192.168.0.245. Right pump netBIOS name is set to »nmtpump2« and IP address is 192.168.0.246. On the »Network« page, »Twin mode with IP:« field assigns Twin IP address. Left pump has the IP address of the right pump in this field, while the right pump has the address of the left one. If you need to change the IP address of the pump because you want to network multiple pumps, make sure you also enter the new address into the connected twin pump.

Single pumps can also work in alternating mode if you connect and set them in a way outlined in the previous paragraph.

Both pumps start when power is applied and settle for priority with the help of a random number. The operating time is thus equally shared even if the power is often interrupted.