

Refrigeration and Air-conditioning Technology

Climate change, the greenhouse effect and global warming – in the 21st Century there is scarcely any other subject that is more ubiquitous or “hotly” debated. Global environmental accords like the international Kyoto protocol or specifically the European directive on fluorinated gases are devoted to the problems associated with greenhouse relevant agents and the search for solutions on a political level. Refrigeration and air-conditioning applications amplify the effects of global warming.

In the first place they contribute directly and in a big way to the greenhouse effect through the emission of coolants containing fluorine like partially or wholly fluorinated hydrocarbons. One example of how these emissions are caused is because of leaks in refrigeration systems which allow coolants to escape into the atmosphere. Secondly, the operation of refrigeration systems also causes additional, indirect CO₂ emissions due to the not inconsiderable amount of energy required for their operation. This problem is compounded by the fact that demand for refrigeration systems is constantly increasing.

Lucas-Nülle has committed itself to this subject and developed a concept to integrate easily serviceable and effective training systems devoted to this growing sector. Refrigeration and air-conditioning technology is a professional area that builds entirely the latest educational and technical know-how. It is the many years of experience that Lucas-Nülle has accumulated combining theoretical know-how with practical applications which empowers course participants to boost their skills and competence in this area.

Refrigeration workshop



Refrigeration workshop

The refrigeration workshop goes beyond the modular refrigeration training system and allows you to foster the practical skills of your trainees. It covers the topics of refrigeration and of electrical engineering. Participants in the course are guided step by step through refrigeration technology and acquire a high-quality grounding for their work in the future. Installation of coolant piping is only one of the many skills which can be learned with the help of the refrigeration workshop.

Important!

Some of the supplies employed with this equipment set are governed by regulations on hazardous goods and therefore require special handling. We recommend procuring these supplies in the respective country of use to avoid a transport of hazardous goods. The relevant supplies are summarized in the associated section.

RCW1 Design and assembly of refrigeration applications



RCW1 Design and assembly of refrigeration applications

Equipment set RCW1-A for the refrigeration workshop allows you to teach the most important and most common applications of refrigeration technology. Thanks to the extensive equipment set, the refrigeration workshop is also suitable for teaching fundamentals of the piping system. The extensive electrical circuitry covers the broadest of application areas.

Knowledge including the following can be taught as part of fundamental practical training:

- Installing and planning technically correct piping for a refrigeration system using copper pipes (bending, flanging, making to measure)
- Installing electrical wiring for a refrigeration system and handling electric current
- Handling refrigerant, filling, disposal and safety
- Start-up, checking for leaks, leak testing and maintenance
- Disassembly or shut-down

The following projects can be completed using the basic set:

- Vegetable cooling cabinet
- Freezer compartment
- Shock freezer
- Fridge compartment with power controlled by hot-gas by-pass
- Refrigeration system with starting controller
- Refrigeration system with winter mode
- 2 Fridge compartments at different temperatures via evaporator pressure regulating valve

These topics incorporate the following skills:

- Set-up and dismantling of piping and piping components
 - Pressure testing, pressure strength testing, electrical tests
 - Calibration of pressure switches
 - Start-up, checking for leaks, leak testing
 - Designing control systems
 - Calibration of pressure switches
 - Filling with refrigerant
 - Siphoning of refrigerant to suitable disposal containers
 - Execution of repairs, e.g. replacing components, changing oil, etc.
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Equipment set comprising the following:

Cold storage construction set (V), 2 evaporators, defrosting system, 1.5x1.5x2.45

SE2675-1B

1

The set consists of the following:

- Cold storage cell consisting of a floor, cover, three closed sides
- One side with door
- Door without handle held closed by two magnetic clamps and self-closing hinges
- Heated door seals with pressure compensation flap
- Illuminated interior
- The interior of the cold storage cell contains the following:
 - 1x V2A (stainless steel) wall grille to accommodate refrigeration components
 - 1x Heater with V2A (steel) protective grille
 - 2x Evaporator with defrosting heater and fan
 - 1x Defrost water drainage system
- Holes drilled in the sides for pipes and wiring to switch cabinet, to compressor and to other cold storage cells.
- Holes are watertight/airtight to diffusion



Technical data:

- Dimensions of cold storage cell: ext. 1500x1500x2450mm
- Dimensions of cold storage cell: int. 1300x1300x2250mm
- Dimensions of wall grille: 1000x1060x20mm
- Dimensions of pipe heater: 980x150x150mm
- Operating voltage: 230V/50Hz
- Heater power : 2000W, switchable to three levels
- Refrigeration power of each evaporator: 1.34kW
- Electrical power of each evaporator: 38W
- Defrosting power of each evaporator: 1.16kW
- Pull connector wires into the switch cabinet and attach them to terminals
- Connections: flare connectors (no soldering or welding permitted)
- Materials for assembly:

60m H05VV3G1

12m H05VV4G1

5m H05VV5G1,5

Appropriate numbers of cable clips and ferrules

All components are to be assembled and connected to the electrical system

SybaWork workbench, 1300x800x870mm, with punched hole panel

ST8070-1D

1

The equipment consists of the following:

- Workbench with multiplex table top, 40mm
- Aluminium profile frame with steel table-top base
- 5 grooves in each profile to accommodate various add-ons
- 3xAluminium profile extensions, 830mm
- Rear V2A steel wall grille, 1230x700x20mm
- Side V2A steel wall grille, 560x800x20mm
- Table dimensions 1300x800x870mm
- Overall dimensions 1300x800x1700mm



Air-cooled evaporator set with additional stop-cocks (flange fittings)

SE2675-1E

1

Semi-hermetic compressor with air-cooled evaporator, liquid receiver with Rotalock fluid valve and connector for excess pressure safety valve. Receiver and evaporator include Rotalock valves mechanically well fastened at the inlet and outlet. All Rotalock valves have flanged fittings.

- Evaporator set filled with inert gas
- 1 x Heater for shaft housing
- 1 x Evaporator with Rotalock valves
- 1 x Compressor with Rotalock valves
- 1 x Receiver with Rotalock valves
- 1 x High pressure switch
- 1 x Low pressure switch
- Connectors: Flange fittings (soldering and welding not permitted)

Technical data:

- Operating voltage: 400 V/50 Hz
- Current consumption: max. 6 A
- Power data: (at an ambient temperature of 43°C, suction gas temperature 20°C)

For R134a

Evaporation temperature -20°C
 Refrigerating power 1.01 kW
 Compressor current consumption 2.1 A
 Power consumption 0.84 kW

For R404A

Evaporation temperature -35°C
 Refrigerating power 0.71 kW

Control cabinet for cold storage cell, all components fitted with control voltage

SE2675-1C

1

The set consists of the following:

- Switch cabinet attached at the rear to the aluminium profiles of the workbench
- Dimensions: 800x800x300mm
- 5 Top-hat rails
- 7 Cable ducts
- 1 Flexible cable tube acting as a cable harness to the cabinet door
- Switch cabinet pre-populated with components with control voltage pre-wired
- 1 Line circuit breaker, 3-pole/16A/B
- 9 Line circuit breakers, 1-pole/10A/B
- 1 Control transformer, 400V/230V (160VA) (T1)
- 1 Operational period counter built into door
- 1 Switch for load heating built into door
- 1 Switch for control voltage built into door
- 1 Main switch built into door
- 3 Green indicator lights built into door
- 3 Red indicator lights built into door
- 1 Blue reset push button built into door
- 5 Power contactor with auxiliary contact, 230V
- 5 Auxiliary contactors with auxiliary contact, 230V
- 1 Transformer protection switch
- 1 Auxiliary switch for motor protection
- 1 Time-delay relay, ETR4-11-A
- 1 Time-delay relay, ETR4-69-A
- 1 ELCB/RCD, 2-pole, I 25 A, I 30 mA
- 1 Legrand defrosting timer
- 1 Switch delay
- 1 Transformer for continuous load 12+12 V/24VA, 230 V/50 Hz (T2)
- 1 Motor protection switch 0 – 4,0
- 1 Motor protection switch 0 – 0,63 (F1)
- 1 Elliwell ID 974 230V/AC with two sensors built into door
- 1 Blemo smooth start unit, SH21-5.5/4
- 94 Terminals, 0-2.5mm², grey
- 11 Terminals, 0-2.5mm², blue
- 29 Terminals, 0-2.5mm², green/yellow
- 30 Dividers
- 2 End terminals
- 25 20-mm openings with screw fittings
- 5 16-mm openings with screw fittings
- Set of labels



Set of cables, leads, ferrules and cable clips (for 1 work station)

SE2675-1D

1

The set consists of the following:

- 32 x H05V-K, 1 mm², 100-m roll, black
- 16 x H05V-K, 1 mm², 100-m roll, light blue
- 4 x H05V-K, 1 mm², 100-m roll, green yellow
- 32 x H05V-K, 1 mm², 100-m roll, red
- 16 x H05V-K, 1 mm², 100-m roll, red white
- 4 x H05V-K, 1 mm², 100-m roll, dark blue
- 4 x H05V-K, 1 mm², 100-m roll, dark blue/white
- 8 x H05V-K, 1 mm², 100-m roll, orange
- 16 x H05V-K, 1 mm², 100-m roll, violet
- 8 x H05V-K, 1 mm², 100-m roll, violet/white
- 8 x H05V-K, 1 mm², 100-m roll, white
- 2 x H05V-F3G1.5, 500-m drum
- 2 x H05V-F5G1.5, 500-m drum
- 10 000 Insulated ferrules, 1mm², red, single
- 10 000 Insulated ferrules, 1mm², red, double
- 100 Faston flat connectors, 6.3mm, for 1mm² leads
- 100 Ring cable clips, M4 x 1mm²



Basic equipment set for cold storage cell project

SE2675-1G

1

The set consists of the following items:

- 2x Thermostatic expansion valves (temperature range +10°C.....-40°C, R 134a)
- 2x Thermostatic expansion valves (temperature range 5°C.....-40°C, R 404A/ R507A)
- 2x Interchangeable nozzle set 1 (R 134a expansion valves)
- 2x Interchangeable nozzle set 2 (for R404A R507A expansion valves)
- 1x Start-up regulator (regulation range: 0.2 bars-6.0 bars, nominal power rating: 5.3 kW)
- 1x Evaporator pressure regulator (regulation range: 5-17.5 bars, nominal power rating: 47.3 kW)
- 1x Power regulator (regulation range: 0.2 bars-6.0 bars, nominal power rating: 4.8 kW)
- 1x Collector pressure regulator with manometer nozzle (regulation range: 3-20 bars)
- 1x Evaporator pressure regulator with manometer nozzle (regulation range: 0-5.5 bars)
- 1x Low-pressure switch (regulation range: 0.2-7.5 bars)
- 1x Low-pressure limiter (regulation range: 0.9-7.0 bars, ambient temperature: -40°C.....+65°C, blocked by hand)
- 1x Thermostat (ambient temperature: -40°C....+65°C, switch: single pole, changeover switch, regulation range -30°C....+15°C, adjustable differential 5.5K-23K)
- 1x Thermostat fan (ambient temperature: - 40°C....+65°C, switch: single pole, changeover switch, regulation range - 30°C....+15°C, adjustable differential 12K-70K)
- 1x Defrosting thermostat (ambient temperature: - 40°C+65°C, switch: single pole, changeover switch, regulation range -5°C.....+20°C, adjustable differential 3.0K-10K)
- 2x Solenoid valves (min. pressure differential at opening 0.0 bars, flow coefficient 0.27m³/h, coil 10 W/12 W, max. 130°C during defrosting)
- 2x Solenoid valves (min. pressure differential at opening 0.5 bars; flow coefficient 0.8m³/h, coil 10 W/12 W, max. 130°C during defrosting)
- 1x Inspection window (with indicator for moisture content in refrigerant,)
- 1x High-pressure monitor (for non-corrosive refrigerants, operating range: 3-30 bars, switching capacity 400V/16A)
- 1x Filter dryer (optimised for HFC refrigerant and polyolester (POE), contents when full 41 cm³, temperature range: -40°C...+70°C, dry performance 5.5kg of refrigerant at 24°C)
- 1x Check valve (flow coefficient 0.56m³/h, temperature of medium: -50°C ... +140°C)
- 1x Check valve (flow coefficient 1.43m³/h, temperature of medium: -50°C ... +140°C)



Technical data:

- Maximum permissible excess operating pressure: 18 bars-34 bars depending on the component
- Operating voltage: 230 V/50 Hz
- Connections: 7/16" or 5/8" flare connectors (no soldering or welding permitted), 1/4" Schrader valve connector

Media:

Interactive Lab Assistant: Montage und Inbetriebnahme von Kälteprozessen

SO2801-1X

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Montage und Inbetriebnahme von Kälteprozessen

Der ILA-Kurs zur Montage und Inbetriebnahme von Kälteprozessen gibt dem Schüler unterschiedliche Arbeitsaufträge zur Bearbeitung in der Kältewerkstatt. Wie in der Realität erhält der Schüler Fließbilder und Schaltpläne die ihm helfen den Arbeitsauftrag zu bearbeiten.

Operating materials

Refrigerant, Suva 134a in pressurised cylinder, contents 12,5l

LM8590

1

To accomplish the actual cooling in a refrigeration system, i.e. to carry away heat, various liquids and gases are used. These are called coolants or refrigerants, which circulate around refrigeration systems transporting heat. They are alternately evaporated and liquefied (condensed). The changes in coolant state can be demonstrably shown using the refrigeration lab. In addition, the system allows for filling with coolant and for coolant to be sucked out.

Technical data:

Coolant type: R 134a

Maximum weight of coolant in system: 12 kg

Unladen weight: 7.9 kg

Container: Pressurised cylinder

Test pressure: 22 bars



Pressurised cylinder filled with 12.5 l of Suva R 404A refrigerant

LM8599

1

In refrigeration systems, the cooling - i.e. transport of heat away from refrigerated objects – is accomplished by means of various liquids and gases, called refrigerants or coolants, which circulate through the refrigeration circuits of refrigerators and air-conditioning systems. As they progress around the circuit they are alternately evaporated or liquefied (condensed). These changes in state can clearly be demonstrated with the help of the refrigeration lab. This system can also be filled with or emptied of refrigerant.

Technical data:

- Refrigerant type: R 404A
- Maximum weight of contents: 12 kg
- Tare weight: 7.9 kg
- Container: pressure cylinder
- Test pressure: 22 bars
- Connector: 1/4"

Nitrogen in pressurized cylinder, 5 l

LM8591

1

In order to identify leaks in a refrigeration system, it is necessary to use nitrogen, which is introduced into the system and which then escapes if there are any leaks. Unlike refrigerant/coolant, leaking nitrogen is visible and causes no damage to the environment. The nitrogen should possess a purity grade of at least 4.0.

Technical data:

Quality: 4.0

Quantity: 5 litres in full cylinder



Bottle for recycling refrigerant, unfilled, T12Y/S50

LM8592

1

A recycling bottle for refrigerant is needed in order to collect the old refrigerant when a new one is put in. The bottle is supplied empty. The coolant let out can either be cleaned or reconstituted into blends.

Technical data:

Supplied empty

Unladen weight: 7.9 kg

Maximum content when full: 9.5 kg



Accessories:

Vacuum meter with setting pointer

LM8586

1

Vacuum meter with setting pointer

This manometer indicates the pressure below atmospheric in conjunction with a vacuum pump.

Technical data:

- Display: analogue with additional min./max. pointer
- Pressure range: 0...1000 bars (+/-)
- Precision class: 1,0
- Temperature range: -25...60°C
- Connectors: Flare 7/16" UNFIT

Vacuum pump, dual-stage rotary vane pump, RZ2.5, with exhaust filter, 230V/50-60

LM8595

1

The two-stage RZ 2.5 is a powerful rotary vane pump with a compact design and low weight. It is ideal for laboratories, as well as operations where a very good vacuum needs to be obtained with only a medium gas throughput. Rotary vane pump stand PC 3 and its GKF 1000i glass cold trap on the suction side allows large quantities of condensable vapour to be pumped out. With a valve and T-piece for measurements and an exhaust filter to filter out atomised oil, the pump stand is designed to be compact, easy to understand, and user friendly.



- Rotary vane pump with exhaust filter
- Number of suction stages: 2
- Suction capacity: 1.6m³/h
- Final vacuum pressure: 2 x 10⁻³ mbar
- Ambient temperature: 12...40°C
- Electrical power: 0.18kW
- Operating voltage: 230V/50...60Hz
- Delivered full
- Exhaust filter, FO R 2/2.5/5/6
- 4 Rubber feet
- High degree of water vapour tolerance thanks to effective gas ballast, despite which a very good final vacuum can be achieved
- Vacuum-tight cut-off without suction nozzle valves
- Long periods between oil changes thanks to larger usable oil volumes
- Simple maintenance thanks to telescopic design

High-pressure disposal equipment for refrigerant, 38.5 bars, 230V/50...60Hz

LM8580

1

This oil-free compressor is meant for disposal of liquid and gaseous refrigerants. It is suitable for extracting all common CFC, HFC and HCFC refrigerants including R410A.

Technical data:

- Safety pressure limiter: 38.5 bar (550 psi)
- Housing: Rugged polyethylene, double-walled
- Self-cleaning function, including filter dryer
- Connection: Detachable 2.5m cable
- Power supply: 230V, 50/60 Hz
- Certified by CE & TUV
- Weight: 11kg
- Dimensions: 250 x 222 x 406mm



Nitrogen pressure regulator RA825GN50, cylinder pressure 200 bars, excess pressure release at 50 bars

LM8596

1

Pressure regulator for gas cylinders made of pressed brass, with pressure gauges for the cylinder contents and working pressure. The nitrogen pressure regulator has been tested by BAM.



Technical data:

- Tube connector: 7/16"
- Inlet pressure [bars]: 0...200
- For use with nitrogen
- Cylinder connector: W 24.3 x 1/14 (IG)
- Working pressure [bars]: 0 - 50
- DIN: DIN 477-1
- Weight: 1.6 kg

Cylinder connector for R134a refrigerant, 7/16" tube connector

LM8597

1

Cylinder connection adapter for pressurised refrigerant cylinders and filling refrigeration systems.

Technical data

- Material: brass
- Cylinder connector: 1/4" internal diameter
- Tube connector: 7/16" external diameter
- Weight: 0.12 kg



Measuring and testing instruments

The measuring and testing instruments are essential for working with the refrigeration workshop. For this purpose, equipment commonly employed in industry is used in order to ensure that the work is similar to authentic practice.

Leak detection equipment for refrigerant and technical gases

LM8593

1

This leak detector is equipped with the latest technology and represents a quick and easy way to detect leakage of coolant, featuring very high sensitivity.

- Infra-red technology
- Lifespan for infra-red sensor = 800 hours with no depreciation
- Sensitivity: 1g/year as per EN 14624
- Detects any refrigerants or NH₃
- 5 Rechargeable NiMH batteries (Autonomie; 6)
- Automatic and manual zero calibration
- Sensitivity selector (Hi/Lo)
- Battery flat display
- Sensor failure warning
- Headphone socket
- With mains adapter



Test leak for testing leak detection equipment (50ml)

LM8594

1

- For calibration of leak detection equipment
- Test quantity 5g/per annum



2-channel differential thermometer with display and connections for radio sensor

LM8575

1

The differential thermometer records temperature values from 2 connected thermocouple probes, and displays these values simultaneously. Readings from an additional temperature sensor transmitted in wireless mode, i.e. via radio, can be displayed additionally on the testo 922 measuring device.

The temperature difference can be invoked directly. Current measurement data such as max./min. values can be printed out on location using Testo quick printer. During cyclic printing, measured data can be additionally output once per minute, for instance.

Functions:

- Display of differential temperature
- Cyclical printout of readings, e.g. once per minute
- Continuous display of max./min. values
- Hold-button for retaining measured values
- Display lighting
- On-site printing with a Testo quick printer (optional)

Technical data:

- Operating temperature: -20 ... +50°C
- Housing material: ABS
- Storage temperature: -40 ... +70°C
- Battery type: 9V block, 6F22
- Dimensions: 182 x 64 x 40mm
- Weight: 1.0kg



TopSafe protective sheath for 2-channel differential thermometer

LM8576

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TopSafe, an indestructible case providing protection against dirt and impact



Type K surface sensor with extra-wide measuring probe, waterproof

LM8577

1

Extremely fast-acting surface probe with a resilient thermocouple strip, also for uneven surfaces; short-term measurement range to +500°C, type K thermocouple

Technical data:

- Measuring range: -60 ... +400°C
- Sensor tube length: 115mm
- Sensor tube diameter: Ø 5mm
- Response time: 30sec
- Cable length: 1.2 m
- Accuracy class: 2
- Connection cable: Fixed, stretched



Type K pipe-contact sensor with interchangeable measuring probes for 5..65-mm pi

LM8578

1

Technical data:

Measuring range: -60 ... +130°C

Response time: 5 sec

Cable length: 1.2 m

Accuracy class: 2

Connection cable: Fixed, stretched



Manometer battery with storage case and filling hose

LM8582

1

The 4-way manometer array is used to measure and adjust pressures in refrigeration systems. The manometer array is suitable for a variety of refrigerants. The low-pressure elements are marked blue, the high-pressure elements are marked red.

Technical data:

- Includes: 4-way manometer array, case, 3 hoses
- Mounting: Suspended
- Manometer: 2 units, oil-filled
- Class 1a
- Scale: R134a
- Hoses: 90cm
- Connections: 7/16" UNF red, black and blue, 5/8" UNF yellow
- Weight: 2.0 kg



Materials for attachment and assembly

This set consists of consumable materials in sufficient quantity to provide for all the needs of a single work station over a period of two years.

set of copper pipes, various widths, for project assembling (2 places)	SE2675-1H	1
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Pipe connector set for components with flare fittings	SE2675-2P	1
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The set consists of the following:

This set is sufficient for 1 work station

- 40 x Lock nuts, 7/16"
- 40 x Lock nuts, 5/8"
- 30 x Lock nuts, 3/4"
- 20 x Lock nuts, 7/8"
- 3 x Double nuts, DM, 7/16"
- 3 x Double nuts, DM, 5/8"
- 3 x Double nuts, DM, 3/4"
- 2 x Double nuts, DM, 7/8"
- 20 x Sealing caps, DK, 7/16"
- 20 x Sealing caps, DK, 5/8"
- 20 x Sealing caps, DK, 3/4"
- 20 x Sealing caps, DK, 7/8"
- 20 x Sealing rings, DR, 7/16"
- 20 x Sealing rings, DR, 5/8"
- 20 x Sealing rings, DR, 3/4"
- 20 x Sealing rings, DR, 7/8"
- 3 x Connectors, VN, 7/16"
- 3 x Connectors, VN, 5/8"
- 3 x Connectors, VN, 3/4"
- 3 x Connectors, VN, 7/8"
- 3 x Connectors, VR, 5/8"-7/16"
- 3 x Connectors, VR, 3/4"-7/16"
- 3 x Connectors, VR, 3/4"-5/8"
- 3 x Connectors, VR, 7/8"-5/8"
- 3 x Connectors, VR, 7/8"-3/4"
- 2 x Schrader T-joints, 7/16"
- 1 x Cylinder connector, FA, 774 305
- 3x T-joints, TN, 7/16"
- 3 x T-joints, TN, 5/8"
- 3 x T-joints, TN, 3/4"
- 3 x T-joints, TN, 7/8"
- 3 x T-joints, TR, 5/8"-7/8"
- 3 x T-joints, TR, 7/8"-5/8"
- 3 x Screw nozzles, AS, 7/16"-5/8"
- 3 x Screw nozzles, AS, 7/16"-3/4"
- 3 x Screw nozzles, AS, 5/8"-3/4"



Set of fasteners for pipes on component bases

SE2675-2N

1

The set consists of the following items:

- 1 x Set of pipe clips, DM, set of 25, 6 Æ
- 1 x Set of pipe clips, DM, set of 25, 10 Æ
- 1 x Set of pipe clips, DM, set of 25, 12 Æ
- 1 x Set of pipe clips, DM, set of 25, 15 Æ
- 25 x House pipe clips, MP-LHI 8-12 M8
- 25 x House pipe clips, MP-LHI 12-16 M8
- 4 x House pipe clips for pressure regulator, MP-LHI 25-31 M8
- 2 x House pipe clips for filter dryer, MP-LHI 38-55 M8
- 25 x Threaded pieces, M8x30
- 25 x Threaded pieces, M8x40
- 25 x Threaded pieces, M8x60
- 12 x Threaded pieces, M8x80
- 100 x M8 nuts
- 150 x Washers M8 8.4x16
- 50 x Hex screws, M6x12
- 18 x Threaded pieces, M6x12
- 12 x Threaded pieces, M6x50
- 12 x Threaded pieces, M6x70
- 50 x M6 nuts
- 100 x Washers M6 6.4x12
- 6 x Spacer collar, M6 x 30 mm
- 4 x Vibration plate, MP-2-C



Set of 25 fasteners for wires and components

SE2675-2M

1

The set consists of the following items:

- 25 x Assembly racks for holes in 8.5/6.5 grid wall panel
- 5 x Assembly racks for holes in 8.5/6.5 grid wall panel

