INDUSTRIALS GROUP

Reavell

Gardner Denver

HIGH PRESSURE SOLUTIONS

Operating & Maintenance Manual

5236 Compressor M-V-A-M

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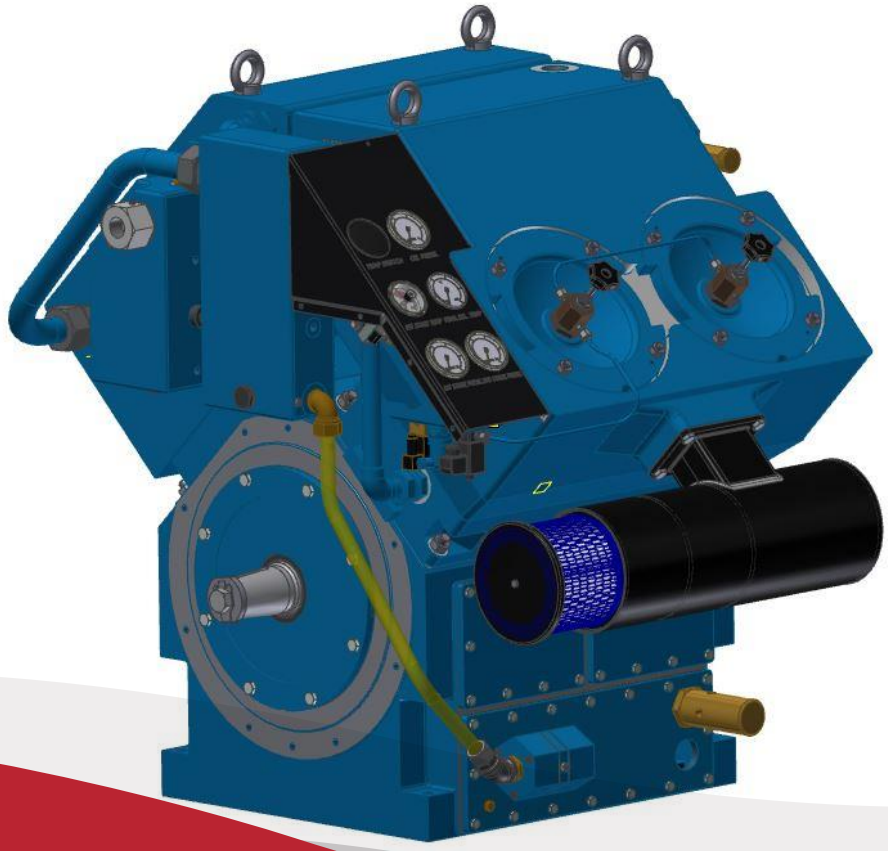

www.gdhighpressure.com

AMENDMENTS

ISSUE No.	DESCRIPTION	DATE	SECTION
1	NEW	09/10/2019	ALL
2	UPDATE GA-VERSION B	15/04/2020	3

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Section 1
General Information

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General Safety Information

 **WARNING** 

The use of replacement parts or lubricating oils not supplied, recommended or approved by **Gardner Denver**, or the failure to maintain this equipment in accordance with the maintenance instructions, may invalidate the **WARRANTY**, cause equipment failure, create unsafe or hazardous conditions or result in damage to the equipment.

Gardner Denver cannot accept responsibility for damage, injury or failure caused by these situations.

USE ONLY GARDNER DENVER GENUINE PARTS AND AUTHORISED SERVICE AGENTS

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1 DISCLAIMER

While every care was taken in the preparation of these instructions, it cannot be guaranteed that every aspect has been covered. Gardner Denver cannot, therefore, accept liability for direct or consequential damage that may arise resulting from non-conformity with this Manual, from repairs carried out improperly, from using other than original spare parts, and from non- observance of good operating and maintenance engineering practices. Should there be any doubt whatsoever, or should any further information or explanation be required, Gardner Denver must be contacted.

This information is given in good faith, no warranty or representation is given concerning such information, which must not be taken as establishing any contractual or other commitment binding upon Gardner Denver.

Gardner Denver reserve the right to make changes to any information contained within this manual without prior notice.

2 FOREWORD

The standard build of all **Gardner Denver** products are not intended for use in either Explosive or Potentially Explosive Atmospheres as defined in Directive 2014/68/EU.

An Explosive atmosphere is a mixture with air, under atmospheric conditions, of flammable gases, vapours, hazes or dusts in which, after ignition has occurred, combination propagates to the entire unburned mixture and may cause a hazard.

Gardner Denver compressors are designed and manufactured to give optimum performance and safety, together with long life and reliability whilst compressing the gas for which they have been designed. They must not be used to compress other gases without prior consultation with the **Gardner Denver** factory.

This Manual will help you to obtain the best performance from your compressor. It provides the information required for safe installation, commissioning and operation, together with a maintenance schedule to ensure maximum service life.

Servicing facilities and the supply of genuine replacement parts are provided through a world-wide network of Gardner Denver companies and authorised distributors, backed by the Gardner Denver factory.

The information in this Manual was correct at the time of printing, but modifications to parts and procedures may be made without notice which could affect the servicing requirements of the compressor.

In any communication concerning the compressor it is necessary to quote the the MODEL, SERIAL No. and CONTRACT reference in order that the correct information is supplied.

It is important that this Manual is retained with the compressor for reference and that it should remain with the compressor if it is sold or transferred to another user. The new user must be made fully aware of the need to study this Safety Section and any Warnings for safe operation given throughout the manual.

3 WARRANTY

The compressor(s) and ancillary equipment supplied by Gardner Denver are covered under Warranty for the period agreed in the Supply Contract.

The equipment provided is well designed to afford many years of trouble free service. However, should the need arise to implement a warranty claim then this can be done using warranty Claim Form obtainable from Gardner Denver Service Department. It should be noted that consumable parts that require replacement during normal compressor operations are not normally covered under Warranty. Similarly, the Warranty does not cover running adjustments.

Gardner Denver are well known in the market place for the design, manufacture and supply of high-quality air compressor equipment. These compressors are constructed from the highest quality materials and are designed and built according to the latest manufacturing techniques. The compressor design will give good service providing that it is operated and maintained in accordance with the information contained within this Manual.

4 MAINTENANCE WARNING

The use of replacement parts or lubricating oils not supplied or approved by Gardner Denver may lead to failures in service which would not be covered by warranty.

Before any servicing or maintenance work is undertaken, the user is advised to contact the local Gardner Denver Company or authorised Distributor for revised or up-dated information.

To ensure continued trouble free operation of the compressor it is important that periodic maintenance and servicing are carried out in accordance with the information given in the "Maintenance" section of this Manual. If any replacement or repair is needed use genuine Gardner Denver parts.

Any unauthorised modifications or failure to maintain this equipment in accordance with maintenance instructions may make it unsafe. The use of replacement parts not supplied by Gardner Denver may create hazardous conditions over which Gardner Denver has no control.

Such hazardous conditions may lead to accidents that can be life threatening, cause substantial bodily injury or result in damage to the equipment. Gardner Denver can bear no responsibility for equipment which has unapproved replacement parts fitteded.

5 STANDARDS, TESTING AND DOCUMENTATION

Gardner Denver / Reavell compressors / booster and modules incorporate manufacturer's standard equipment and selected components in order to manufacture specific packages for the compression of Air and Gases. Reavell design, manufacture, testing is based in general on the following standards:-.

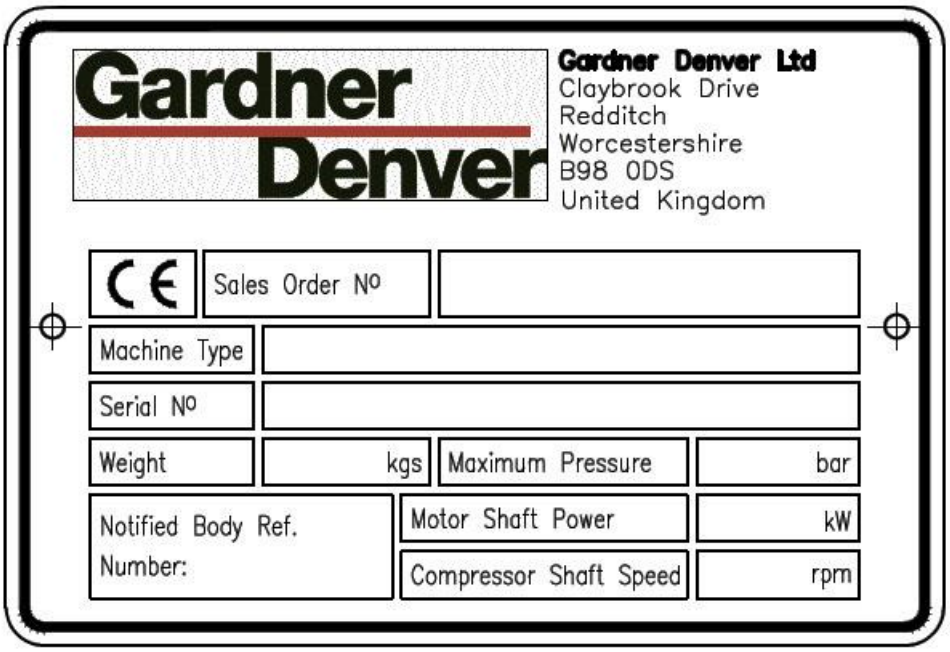
2006/42/EC	Machinery Directive
BS EN292	Safety of Machinery
BS EN1012-1	Compressors – safety requirements
2014/68/EU	Pressure Equipment Directive
2014/34/EU	Equipment and Protective Systems Intended for Use in Potentially Explosive Atmosphere (ATEX) Directive

Gardner Denver quality systems are accredited with ISO 9001 approval by Lloyd's Quality Assurance.

6 OWNERSHIP DATA

6.1 TECHNICAL DATA

It is recommended that details taken from the compressor nameplates are recorded below.



6.2 GARDNER DENVER CONTACT DETAILS

Address	**Gardner Denver Ltd** **Claybrook Drive** **Redditch** **Worcestershire** **B98 0DS** **UK**
Telephone	**+44 (0) 1527 838600**
Fax	**+44 (0) 1527 838630**
Email	**highpressure@gardnerdenver.com**
Web	**www.gdhighpressure.com**

For any comments or queries about the contents of this manual, please write to Gardner Denver at the above address.

7 WARNINGS, CAUTIONS & NOTES

The following details for this Safety Section relate to ESSENTIAL SAFETY REQUIREMENTS referred to in Machinery Directive 2006/42/EC.

CE

Warnings call for attention to operating procedures involving specific hazards which could cause injury or death and are identified by the following

		
RISK OF DANGER	**RISK OF HIGH PRESSURE**	**RISK OF GAS EXHAUST**
		
RISK OF ELECTRIC SHOCK	**RISK OF HOT SURFACE**	**CONSULT MANUAL**

8 HEALTH AND SAFETY PRECAUTIONS

The following health and safety precautions must be read in conjunction with any other manufacturers equipment supplied.

8.1 GENERAL PRECAUTIONS

This compressor is designed to compress only the gas(es) or gas mixes detailed in the **LEADING PARTICULARS**. Operation with any other gas(es), concentrations or constituents than those specified, may result in fire or explosion in the compressor, in the filters, or other ancillary equipment, and could lead to sever injury, death, and significant property damage.

For the Heliox compressors sets with 3 inlets, suitable measures must be taken to ensure that the compressor cannot operate on oxygen concentrations exceeding 21%. Example: an inlet oxygen system integrated into the compressor control system.

Operation, maintenance, repair or modifications to the compressor and its associated equipment must only be carried out by competent persons under a “PERMIT TO WORK” system.

The compressor safety relates to the document EN1012-1 Compressors and vacuum Pumps - Safety Requirements, and the UK Pressure Systems Safety Regulations 2000.

When handling, operating or carrying out maintenance on the station, personnel must observe safe engineering practices and all relevant local regulations.

Gardner Denver cannot anticipate every possible circumstance which might represent a potential hazard. The **WARNINGS** in this manual are therefore not all inclusive. If the user employs an operating procedure, an item of equipment or a method of working which is not specifically recommended by Gardner Denver, then they must ensure that the unit will not be damaged or made unsafe and that there is no risk to persons or property.

Read and understand all WARNINGS, CAUTIONS & MANDATORY LABELS on the compressor before operating, carrying out maintenance or servicing.

When using cleaning solvents, provide good ventilation and use suitable protection such as a breathing filter face mask, safety glasses, protective apron and gloves.

Safety shoes should be compulsory in all workshops. Safety helmets must be worn if there is a risk of falling objects.

If using compressed air for cleaning purposes, ensure safety regulations are complied with and appropriate clothing worn. Never use compressed air to clean loose dirt from clothing.

Never direct compressed gas onto your skin or at other people.

Before releasing compressed air or gas through a flexible hose, make sure the free end is held securely so that it cannot whip and cause injury.

8.2 INSTALLATION PRECAUTIONS

Installation work must only be carried out by competent personnel under a “PERMIT TO WORK” system

A fused isolator switch must be fitted between the main power supply and the compressor. The isolator shall be suitably sized and be in accordance with Section 7.2 of EN 60204-1:2006 & A1:2009.

If not requested with the supplied equipment, suitably sized over-current protection must be provided to protect the power circuit. The protection shall be in accordance with Section 7.2 of EN 60204-1:2006 & A1:2009.

Guards must be fitted to make sure that Foreign Objects cannot be drawn into cooling air intake ducting or louvers.

Ensure that the discharge gas piping from the compressor module to the users pipework, gas storage cylinders or gas dispensing system is free to expand and that no flammable material is within the vicinity. If any such material is close-by take steps to preclude ignition.

A manual shut-off valve should be fitted in the discharge line to allow the compressor to be isolated. Non return valves cannot be relied upon for isolating parts from a pressure system. A safety valve must be installed between any compressor unit and the isolating valve.

A pressure-reliving device must be fitted to every pressure vessel, or equipment containing air or gas above atmospheric pressure. They must be suitably sized for the pressure and flowrate of the gas involved. For specific details, contact Gardner Denver.

To minimse the risk of Legionnaires Disease, Gardner Denver advise caution with the use of cooling towers for water cooling the compressor. Potable water should be used, and treated where necessary to prevent harmful bacteria from entering the compressed air. The cooling tower manufacturers maintenance schedules should be observed to prevent the development of harmful bacteria. Closed circuit or direct mains cooling is preferred.

Always use an appropriate shackles or hooks, properly positioned. Arrange lifting cables so that there are no sharp bends. Use a spreader bar to ensure vertical lift and avoid side loads on hooks, eyes and shackles and never leave a heavy load unattended.

When a load is on a hoist stay clear of the danger area beneath and around it. Keep lifting acceleration and speed within safe limits.

8.3 OPERATIONAL PRECAUTIONS

The compressor must only be operated by competent personnel under a qualified supervisor.

If the compressor noise levels are greater than 85 dB A at one meter, ear defenders should be worn by operators.

Ensure that all instructions concerning operation and maintenance are strictly followed and that the complete installation with all accessories and safety devices are kept in good order.

Do not operate the compressor module, or any other parts of the equipment with any inspection cover removed. e.g. compressor crankcase doors, valve covers,dispenser panel etc.

Do not remove or tamper with safety devices, or guards. This does not only extend to mechanical safety devices and guards, but all devices including electrical safety devices and controls. Particular attention should be paid to low inlet pressure sensing devices which must be operational in conjunction with the compressor control system during compressor operation.

The maximum pressure for safety valves under fault conditions is 1.10 times the set pressure, the set pressure being a minimum of 1.05 times the maximum operating pressure to ensure seat tightness.

Compressor sets designed for use with flammable gases are fitted with low inlet pressure switches. These are an essential safety item. Their operation should be checked regularly. They must not be tampered with or linked out of operation. Should the gas inlet pressure fall to a low level and the switch has been linked out or made inoperable there is a danger the compressor will draw in air. This could then form an explosive mixture within the compressor. In extreme conditions it could also allow air to be drawn into the gas main.

Pipework or other parts with a surface temperature above 70°C which may be accidentally touched in normal operation must be guarded or insulated. Other high temperature pipework should be clearly marked.

The compressor must only be operated at the supply voltage and frequency for which it is designed. Always isolate power before maintenance or servicing.

When mains power is ON, lethal voltages are present in the electrical circuits.

ESSENTIAL MAINTENANCE WORK ON THE ELECTRICAL SYSTEM MUST ALWAYS BE COMPLETED BY A QUALIFIED ELECTRICIAN.

If the compressor is equipped with a Remote Control device, attach warning notices stating ***"THIS UNIT CAN BE STARTED REMOTELY***" in prominent locations around the equipment.

If there is any indication that the compressor is overheating it must be shut down. (***A high air or gas temperature switch is fitted as standard to guard against operating with excessive temperature).*** Beware of burns from hot oil and water (if applicable) when working on a unit recently shut-down.

Use only lubricating oils and greases approved by Gardner Denver to avoid potential hazards especially the risk of explosion or fire and the possibility of decomposition or generation of hazardous gases.

8.4 MAINTENANCE & REPAIR PRECAUTIONS

Maintenance, repair and modifications must only be carried out by competent persons under a "PERMIT TO WORK" system..

Pressure gauges, temperature switches and other protection devices should be checked at least every 12 months and thoroughly examined at least every 48 months. They must be renewed or service exchanged if acceptable tolerances are exceeded or if they are not functioning correctly.

Before dismantling any part of the compressor close, and lock if possible, the isolating valves upstream and downstream of the compressor system's air, gas and water supplies as appropriate.

Check that all pressure gauges register zero and that all air or gas pressure in the system has been released.

Before dismantling any part of the compressor, ensure that all heavy movable parts are secure.

Oil lubricated compressor will have preserving oil applied to interior surfaces. Oil free models will have desiccant bags in valve covers and distance pieces which must be removed prior to start-up.

Protect components and exposed openings by covering with clean cloths or tape during repair or maintenance work.

Protect all items as necessary against the ingress of moisture if steam cleaning is undertaken.

On completion of any maintenance or repair ensure that no tools, loose items or rags etc., are left on or inside the compressor or other parts of the system.

Always clean oil spills from the compressor module before and after maintenance work.

Viton Seals

- Viton 'O' seals under normal operating conditions are safe.
- However, should there be a fire within the compressor or these seals are likely to exceed a temperature of 300°C the material will decompose.
- ***Degraded Viton gives off Hydrogen Fluoride fumes and if in contact with skin an acid is formed causing severe burns***.
- If Viton seals appear charred or gummy do not touch with unprotected hands: wear neoprene or PVC gloves.
- When the seal has been removed, wash the area with limewater and avoid breathing any fumes. If contamination of the skin occurs, wash with limewater and seek medical advice.

8.5 PRECAUTIONS IN THE EVENT OF FIRE WITHIN THE COMPRESSOR

Use extreme caution when handling components that have been subjected to fire or very high temperature. Some components may contain fluoroelastomer materials which decompose under these conditions to form highly corrosive residues. Skin contact can cause painful and penetrating burns resulting in permanent skin and tissue damage.

9 PURGING INSTRUCTIONS FOR GAS INSTALLATIONS

Before any attempt is made to run the compressor on process gas, the operator must be satisfied that the compressor and its associated pipework is purged free of air and that they are fully conversant with the operating procedures of the equipment.

If in any doubt as to efficiency of the purging, always repeat the procedure.

When the gas being compressed is flammable, or its purity is important, it must be a plant requirement to purge the compressor to remove any air in it before letting the process gas into the system. The compressor should be purged free of air, in accordance with purging procedures which apply to the whole plant using the inert gas specified, after the compressor has been commissioned on air and before the process gas is introduced into the system.

The installation should have purging valves fitted to the inlet and outlet lines of the compressor, permitting the inert gas used for purging to be admitted and discharged before and after the equipment being purged.

Once this has been acheived the valves should be locked and /or plugged to avoid them being left open whilst running on gas.

Operators should also be aware that the compressor is not guaranteed leak tight whether in normal operation or under fault conditions and It is assumed that the compressor is situated in a well ventilated area with suitable gas leakage detection equipment to minimise possible risks.

Due to the unknown nature of the plant processes involved, Gardner Denver cannot be held responsible for any heath risk arising from leakage of gas into the atmosphere.

The following comments may help to achieve successful purging of the compressor:-

The use of an **Oxygen** meter is recommended when purging prior to running on flammable gases.

Feeding the purge gas at pressure (maximum 0.5 bar g) will speed up procedure.

The crankcase will be purged more quickly if the oil filler cap is removed and the rod inside is depressed to allow the air to escape.

The pipes from the separators to the unloader valves and from the first stage to unloaders (and water valve if fitted) can be purged by disconnecting them at their far end, allowing the purge gas to pass through and remove the air, before reconnecting them.

After any maintenance or repairs have been carried out which involves dismantling and opening up gas containing parts, the system must always be re-purged.

10 DISPOSAL OF CONDENSATE AND USED PARTS

Whilst recyclable materials are used as far as possible, please ensure when disposing of condensate, spent oil, used filter elements and any discarded parts or waste material of any kind make sure that there is no pollution to any natural water-course, drain system and that no burning of waste takes place which could cause pollution of the atmosphere.

Condensate, waste oil and used consumable items should be disposed of in line with Local Authority regulations and Section 7.1.4 of EN 626-1:1994+A1:2008.

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Section 2

Compressor

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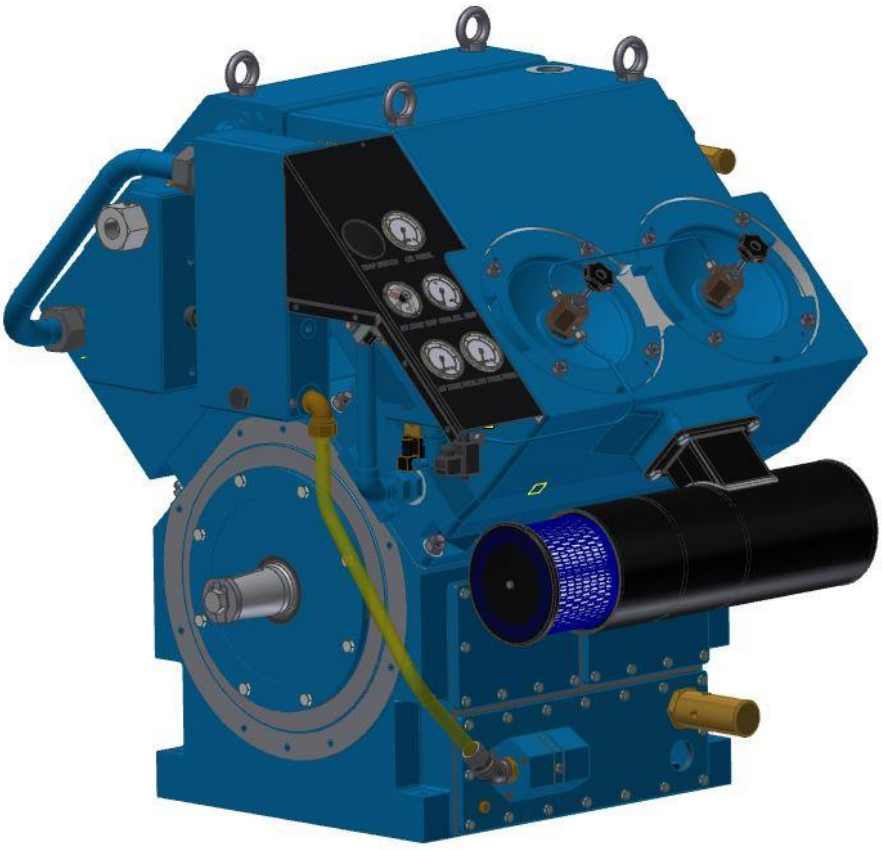
INSTALLATION, OPERATION & MAINTENANCE MANUAL

C5236.MK2
WATER-COOLED COMPRESSOR



Point of Contact

1) For general enquiries, please contact:

Address:	Gardner Denver Ltd Claybrook Drive, Redditch, Worcestershire B98 0DS UK
Telephone:	+44 (0)1527 838 600
Fax:	+44 (0)1527 838 630
E-mail:	highpressure@gardnerdenver.com
Website:	www.gdhighpressure.com

2) Technical Support Service

Gardner Denver Technical Support covers the whole of the United Kingdom and provides its customers with one simple port of call for product support, for all brands and all models.
Please note currently Gardner Denver technical support system is only for English speakers.

- Technical Product Support Questions
- Fault Diagnosis & Repair Guidance
- Service & Maintenance Questions
- Installation Questions
- Legacy Product Support
- Downstream Equipment
- Compressor Sequencing Systems
- Part Number Queries
-

For non-urgent product enquiries, email: **technicalsupport.uk@gardnerdenver.com**
For non-urgent parts enquiries, email: **partsupport.uk@gardnerdenver.com**
Immediate telephone support enquiries to **+44 (0)333 566 1000**
Technical service is available between 8:30am and 5:00pm, Monday to Friday except public holidays.

Spare Kits

Running Hours*	50	1000	2000	3000	4000
Kit Number	HSK1503	HSK6556	HSK6564	HSK6556	HSK6572

***The above service schedule repeats after the final service listed.**

Recommended oil

Oil Type	GD Oil Brand	Working Temperature
Synthetic oil	SYNTECK S	+ 5 to 45°C
Synthetic oil	SYNTECK W	- 5 to -10°C

For dry Nitrogen* Applications, Restrict use only

Oil Type	GD Oil Brand	Working Temperature
Synthetic oil	SYNTECK S/W	< +15°C
Synthetic oil	SYNTECK N*	> +15°C

(Use Sump Heater when it is below 15°C ambient)
* Dry Nitrogen definition is <50 ppm (M/M) water or <10 ppm (V/V) oxygen.

To order spares

To avoid unnecessary delay, on all correspondence, please quote:

- **Complete invoicing and shipping address.**
- **Machine Model Reference No.**
- **Sales contract No.**
- **Serial No.**
- **Part No.**
- **Description**
- **Quantity required**

Due to our policy of continuous improvement we reserve the right to alter, modify and update without prior notice.

Gardner Denver
HIGH PRESSURE SOLUTIONS

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C5236.MK2 COMPRESSOR WATER-COOLED OPERATING & MAINTENANCE MANUAL

AMENDMENTS

ISSUE No.	DESCRIPTION	DATE	SECTION
1	-	NOV 1997	ALL
2	-	MAY 1999	9E
3	CHANGE TO MAIN BEARING BUSH/THRUST WASHER	AUG 2001	9A
4	ADD STUDS & NUTS TO SERVICE PLANS MAJOR OVERHAUL	JUL 2002	10
5	ADD CHECK CONDITION OF CRANKCASE TO CYLINDER STUDS & 2ND STAGE PISTON RINGS TO 6000 HOURS SERVICE PLAN.	NOV 2002	10
6	REPLACE RSP'S WITH NEW HSK SERVICE PLAN	OCT 2008	9.6
7	MINIMUM PRESSURE FOR SUCTION UNLOADERS ADDED, ALTERNATIVE WATER VALVE ADDED	FEB 2009	4.11 13.13
8	STANDARD WIRING TERMINAL NUMBERS ADDED	MAR 2012	14
9	UPDATE TO GARDNER DENVER VERSION	NOV 2014	ALL
10	ADD FRONT PAGE, REVIEW CONENT, REMOVE SAFTEY SECTION AND ACCILIARY PARTS SECTION	APR 2015	ALL
11	UPDATE PISTION DIAMETER AT 2.10	AUG 2015	2.10
12	LUBRICANT OIL NAME CHANGE	JUN 2015	VARIOUS
13	UPDATE ILLUSTRATED PARTS LIST SECTION	SEP 2017	9
14	UPDATE DRAWINGS AND LAYOUT	MAY 2018	VARIOUS

1 GENERAL DESCRIPTION AND OPERATION

1.1 CONFIGURATION

The C5236 Mk2 is a four cylinder, single acting, two stage, 90° vee configuration, water cooled machine. It has complete primary balance when fitted with aluminium first stage pistons, giving excellent balance characteristics.

1.2 LUBRICATION

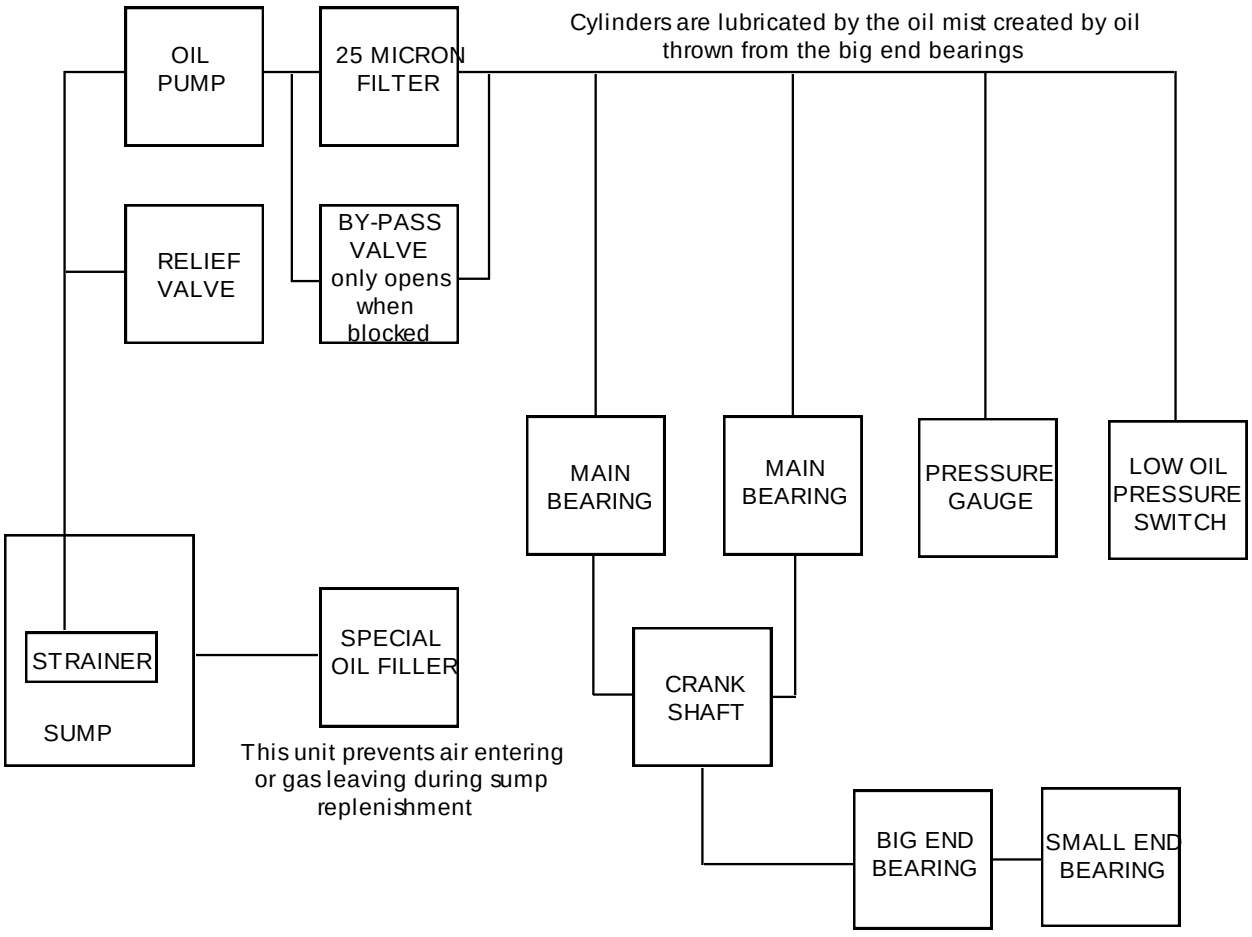
The forced feed system is shown on following page.

The specified lubricant must be used at all times to ensure safe and efficient operation with minimum wear and maximum protection against moist air corrosion.

Recommendations are the result of extensive research at Gardner Denver Works and all responsibility for the use of an oil other than that recommended is placed on the purchaser and his oil company.

THE NORMAL GUARANTEE MAY BE INVALIDATED SHOULD A FAILURE BE ATTRIBUTED, BY GARDNER DENVER WORKS, TO THE USE OF A LUBRICANT NOT RECOMMENDED.

1.3 LUBRICATION SCHEMATIC FLOW DIAGRAM



1.4 COOLING

Cooling is by water flowing through the jackets and passages, either from the mains or a closed circuit system using a radiator or cooling tower. A bursting disc is fitted to prevent excessive pressure build up in the water spaces if a leak should occur from the coolers.

Electrolytic corrosion of the cooler tubes and fittings is prevented by the provision of a sacrificial anode (corrosion rod) in the water jacket which will be chemically attacked before the machine components.

1.5 DRIVE

Drive can be by flange mounting or vee belt transmission from a suitable power source, such as an electric motor or Diesel engine. See Section 10 for details of belt maintenance.

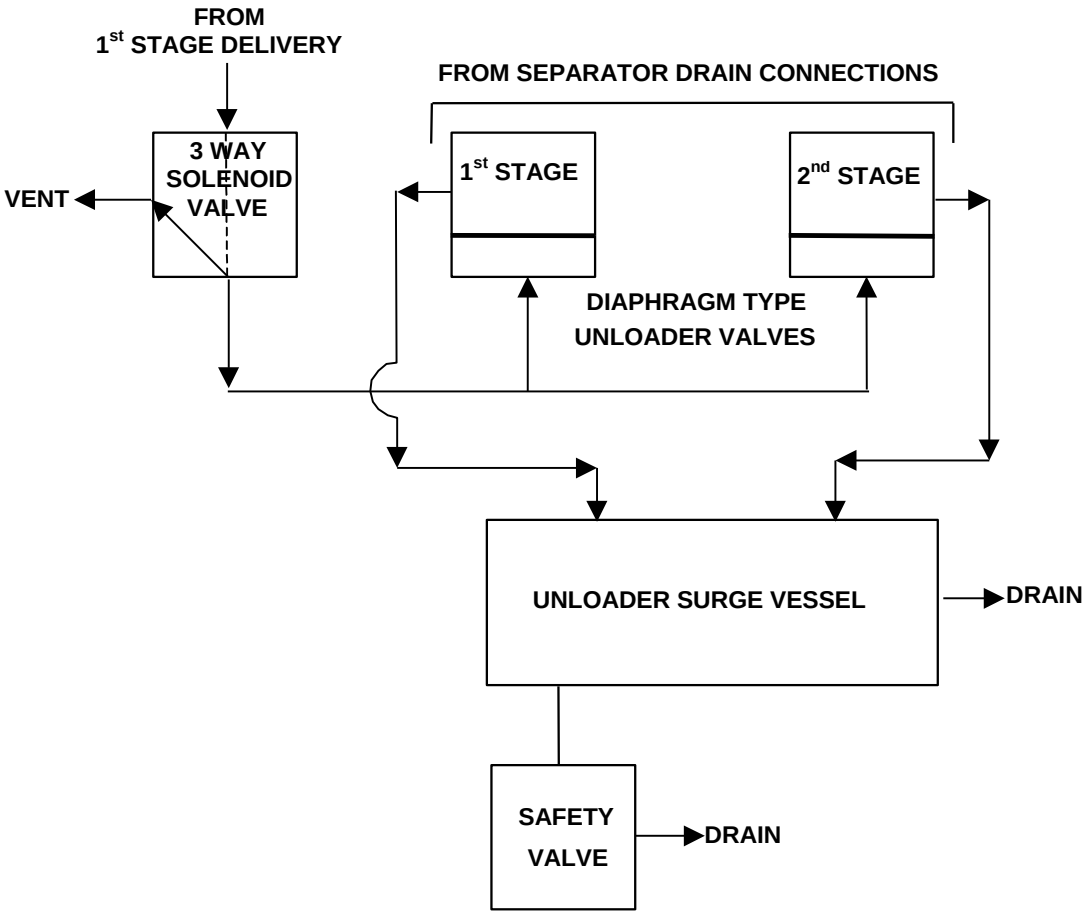
1.6 RUNNING GEAR

Main bearing bushes, big and small end bearings are all replaceable.

1.7 VALVES

Both stage valves are of the flat, low lift, multi-ported type and combine suction and delivery functions. All valves are easily accessible for maintenance and replacement when required. One valve cover per cylinder and good flow characteristics are a feature of this reliable valve design.

1.8 CONDENSATE DRAINAGE SYSTEM



This system comprises a pilot unloader valve, (PUV), and two diaphragm drain valves, (DDV's). The PUV comprises a three way air valve operated by a solenoid in one direction and a combination of air and spring pressure in the opposite direction and is automatically actuated by a signal from the motor starter or a electronic timer. It is of the normally closed mode (compressor unloaded) when de-energised.

The DDV's are positioned below the crankcase doors mounted on the door of the surge vessel, this being an integral part of the crankcase, they are piped to the first and second stage separators and function as unloaders and condensate drain valves.

When the PUV solenoid is energised, first stage air pressure activates flexible diaphragms within the DDV's which forces the valve onto their seats, thus bringing the compressor onto load. When the PUV solenoid is de-energised the first stage is released to atmosphere via the PUV exhaust port and air pressure from both the compressor separators forces the DDV's open allowing condensate to drain from the separators and the compressor to run in an unloaded condition. The system is designed so that the DDV's are open during starting, for condensate draining whilst running on load and on shutdown.

It is essential that a timer is fitted in the unloading circuit to provide a timed drainage facility to prevent accumulation of condensate. Time between drainage cycles should be set to a 30 minute period with an approximate 5/6 second duration to clear condensates from the separators.

Note: in high humidity/temperature atmospheric conditions the drain cycle time must be reduced, Contact Gardner Denver Ltd for more information.

1.9 SUCTION UNLOADING

The unloading of the suction valves during compressor start-up is necessary to reduce starting torque and prevent motor overload.

This system comprises a PUV and two first stage suction unloaders. The PUV comprises a three-way air valve operated by a solenoid in one direction and a combination of air and spring pressure in the opposite direction this is automatically actuated by a signal from the starter/control panel. It is of the normally open mode (compressor unloaded) when de-energised.

The first stage suction unloaders are positioned on the first valve covers and are used to automatically unload the compressor during starting and when running unloaded.

When the PUV solenoid is de-energised , second stage (i.e. receiver) air pressure forces the unloader piston down to unload the first stage suction valve until the solenoid is re-energised, bring the compressor on to load.

The suction unloaders can also be used manually, by means of the hand operated knobs.
Manual operation is necessary when the system pressure is lower than 10 barg. Lower system pressures may prevent correct operation of unloaders and cause motor overload.

To operate by hand, screw down knobs fully in a clockwise direction, this moves the push rod which operates the valve unloader fork to hold the suction valve plate off its seat thus allowing air to flow freely in and out of the compressor cylinder without compressing the air.
Note: It is important to unscrew the knob fully (anti-clockwise) when full operational speed is attained.

WARNING!
SUCTION UNLOADERS MUST ONLT BE USED BY HAND TO SUPPLIMENT AUTOMATIC DDV SYSTEM AND RELEASED IMMEDIATELY THE DDV'S ARE ACTIVATED TO LOAD COMPRESSOR. FAILURE TO OBSERVE THIS PROCEDURE CAN LEAD TO UNACCEPTABLE HIGH SECOND STAGE TEMPERATURES.

1.10 AUTOMATIC STOP/START CONTROL

On initial starting the compressor is unloaded by the diaphragm drain valves and first stage suction unloaders. After approximately 10 seconds when full operational speed is reached the two PUV solenoids for operating the DDV's and suction unloaders are energised and the compressor delivers air normally. When the receiver pressure reaches the pre-determined setting, the pressure switch signals the motor starter to stop and unload the compressor or, if a run-on timer if fitted, the compressor will run in an unloaded condition for a period of ten minutes before being shut-down automatically. If the low set point is reached during this period the compressor will come back onto load.

1.11 INSTRUMENTATION

Pressure gauges are fitted to both stages, also an oil pressure gauge.

One temperature cut-out switch is fitted to the first stage delivery before cooling, another to the final delivery after cooling. These monitor temperatures and provide a signal to the starter/control panel to shutdown the compressor in the event of the set point being exceeded. High temperatures can result from the effects of valve leakage and reduced water flow. Compressor temperature is monitoried by a temperature switching gauge and a sensor fitted in the first stage air stream.

2 LEADING PARTICULARS

2.1 UNIT DESIGNATION

Model C5236 Mk2

For Air compressors:
This compressor is designed for use compressing Air.
This compressor is NOT designed to compress any other gases.

2.2 TECHNICAL DATA – GENERAL

Type ..... Four cylinder, 2 stage, vee configuration
Cooling ..... Water
Direction of rotation, viewed from drive end ..... Anti-clockwise
Number of valves ..... One combined suction and delivery per cylinder
Type of valve ..... Flat plate, standard lift
Mounting ..... Three point, anti-vibration mounts

2.3 TEMPERATURES

Minimum ambient temperature ..... 0°C
Maximum ambient temperature ..... 45°C
Maximum ambient for radiator sets *(Contact Gardner Denver Ltd for lubricant/duty restrictions)* ..... 30/40°C
Maximum water inlet temperature ..... 37°C
Temperature rise across machine ..... 10°C to 12°C

2.4 SPEEDS

Minimum speed ..... 750 rpm
Maximum speed ..... 1800 rpm

2.5 PRESSURES

Minimum working pressure ..... 10 bar
Maximum working pressure ..... 40 bar
Maximum inlet pressure ..... 0.14 bar
Maximum water pressure ..... 5.1 bar
Water jacket test pressure ..... 10.3 bar
Oil pressure ..... 2 to 2.75 bar
Oil pressure (minimum worn compressor ..... 1 bar

2.6 INTERNAL DIMENSIONS

Piston stroke ..... 75 mm
First stage cylinder bore (2 off) ..... 185 mm
Second stage cylinder bore (2 off) ..... 75 mm

2.7 LUBRICATION

Crankcase oil capacity ..... 42.5 litres
Recommended oil – Mineral ..... MYNTECK
– Synthetic ..... SYNTECK S
Recommended grease (for assembly) ..... Shell Alvania R3

2.8 COOLING

Cooling water flow @ 15°C ..... 75 l/h/kw

2.9 CONNECTIONS

Suction connection Rp3
Final stage delivery connection Rp1
Water inlet and outlet connections Rp1 1/4

2.10 RUNNING CLEARANCES

Description	Stage	As Fitted (mm)	Max Permissible (mm)
Piston vertical clearance	1	0.5/1.2	1.2
	2	0.25/1.35	1.35
Piston ring gaps	1	0.2/0.45	1.43
	2	0.07/0.1	1.3
Piston ring axial width clearance	1	0.05/0.1	0.15
	2	0.01/0.045	0.08
Piston/Plunger Diameter			
----------Cast Iron	1	184.85/184.82	184.77
----------Aluminium	1	184.80/184.83	184.75
----------Above top ring	1	184.45/184.48	184.40
----------Cast Iron	2	74.91/74.89	74.84
Cylinder/Liner diameter	1	185.05/185.00	185.11
	2	75.03/75.00	75.09
Small end bearing diametral clearance in conn rod	1	0.010/0.050	0.1
	2	needle roller	-
----------in piston	1	0.003/0.013	0.03
	2	0.025/0.044	0.09
Big end bearing diametral clearance	all	0.066/0.12	0.24
Small end bearing end float	1	0.15/0.64	1.0
	2	0.15/0.55	1.0
Crankshaft end float	-	0.19/0.54	0.75
Main bearing diametral clearance	-	0.05/0.135	0.2
Oil pump outer rotor diametral clearance	-	-	0.26
Oil pump innerr rotor lobe clearance	-	-	0.15
Oil pump outer axial clearance cover to rotor	-	-	0.13
Coupling face distance Direct Coupled sets	-	2-6	6

2.11 TORQUE WRENCH SETTINGS

2.11.1 CLASS A – CRITICAL

(All figures ± 5%)

ASSEMBLY OPERATION	SIZE	NEWTON METRE (Nm
Big End Bearing Bolts	M16	203
First, Second Stage Cylinders to Crankcase	M12	95
First Stage Cooler Cover – Floating End	M12	95
First Stage Cooler Cover – Fixed End	M12	95
Second Stage Cooler Cover – Floating End	M16	235
Second Stage Cooler Cover - Fixed End	M16	235
Fixed End Tubeplates to Cylinders	M10	55
First Stage Valve Cover	M12	54
Second Stage Valve Cover	M20	121
Flywheel Bolt	¾ UNF	162
Coupling Ring to Flywheel	M10	55

2.11.2 CLASS B – NON-CRITICAL

(All figures + 5% - 15%)

ASSEMBLY OPERATION	SIZE	NEWTON METRE (Nm
First Stage Valve	M10	21
Second Stage Valve	M8	11
Driving End Main Bearing Housing to Crankcase	M12	95
Outer End Main Bearing Housing to Crankcase	M12	95
Outer End Cover	M8	27
Oil Pump	M8	27
Oil Filter to Crankcase	M8	54
Breather to Crankcase	M6	11
Bell Housing to Crankcase	M12	95
Bell Housing to Motor	M16	162
Motor Bracket to Crankcase	M16	162
Bursting Disc Cover	M10	54
Crankcase Door	M8	27
Surge Vessel Door	M8	27
DDV to Surge Vessel Door	M8	27

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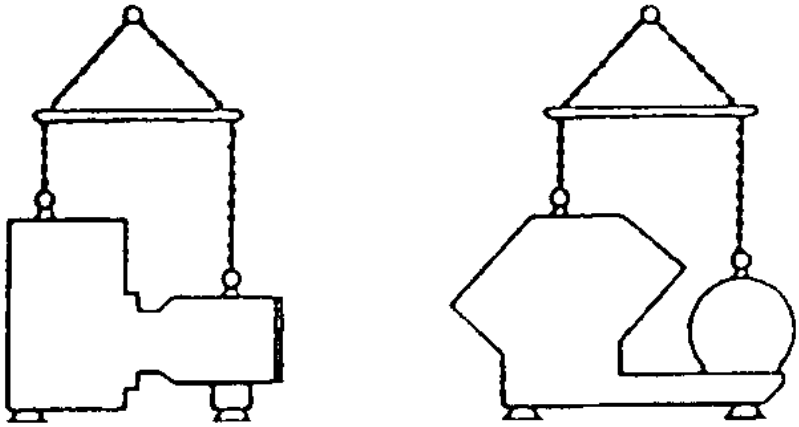
3 INSTALLATION

3.1 HANDLING OF UNIT

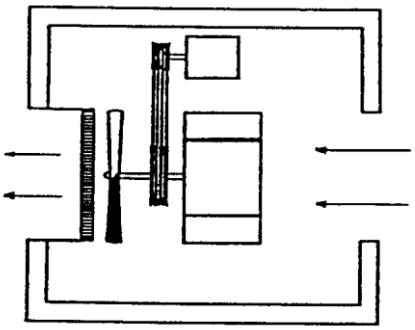
When using the compressor and motor eyebolts as the slinging attachment, it is essential that a spreader is used. The lift should always be made vertical, as inclined loadings drastically reduce the eyebolts' strength. Suitable shackles should be used for this operation.



3.2 LOCATION

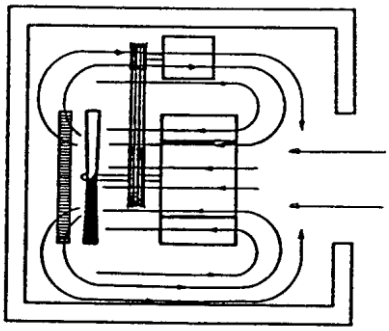
Compressor should be installed in a cool, level, well ventilated position, clear of fumes, heat or high humidity, to ensure efficient performance and also to prevent temperature problems.

RADIATOR SETS



RECOMMENDED INSTALLATION

COOLING AIR ENTERS, PASSES OVER MACHINE AND AS HEATED AIR, IT IS EXHAUSTED FROM THE MACHINE ENVIRONMENT



INCORRECT INSTALLATION

COOLING AIR ENTERS, PASSES OVER MACHINE AND THEN AS HEATED AIR, RE-CIRCULATES IN MACHINE ENVIRONMENT.

It is imperative that the radiator fan works in a cool, clean, direct air flow and that there is a reasonable air gap around the radiator or it is fixed into a wall. As a large percentage of the compressor cooling water heat is dissipated via the radiator to the inducted air stream, it is essential that expired cooling air has an unobstructed passage and exit and does not, under any circumstances, re-circulate in the immediate compressor environment. If more than one compressor set is installed, each must have its own direct air flow and in small buildings and enclosures the radiator(s) should be sealed to an outside wall by means of a duct of a sufficient area for the ventilation required.

Allow sufficient space around the installation to enable safe maintenance working conditions.

Protection from severe weather conditions is desirable.

Maximum allowable ambient cooling air temperature for radiator cooled sets is dependant on many variables eg, pressure, speed and type of oil. Contact Gardner Denver Works to ascertain allowable temperature for operating conditions.

3.3 MOUNTING

Under normal circumstances a special foundation is unnecessary but verification must be obtained that the support floor is structurally adequate as well as flat and level. If installed adjacent to vibrating machinery it may be necessary to bolt down the isolation pads but when tightening, ensure the isolation pads are not distorted. If bedplate mounted, ensure floor is level and even surfaced, to prevent distortion.

3.4 CONNECTIONS, PIPEWORK AND FITTINGS

Full consideration must be given to system and pipework layout. Check piping and connections are suitable for pressures and capacities and if the compressor is flexibly mounted, adjacent pipework must also be flexible.

Pipework adjoining the compressor should consist of short flexible sections to facilitate maintenance removal of pipework and absorb any vibration.

It is essential that all pipework is made and installed so that it is not constrained or distorted when connected to the compressor. Where ever possible use 90° bends with 8" (0.2m) radius, not elbows. This should provide the discharge pipework with the necessary flexibility to allow for thermal expansion.

Before completing pipework assembly, ensure all port protection plugs and blanks are removed and suction pipe sections are clear of jointing compound, scale, swarf, dirt or other foreign substance. The system must be suitably braced to prevent vibration and coupling strain on the compressor. Flexible suction piping should be suitable to withstand suction collapse.

If suction is from a gas main, prevent transfer of liquid from the main to the compressor pipe by connecting the latter to the top of the main pipe.

Separators and drain traps of adequate capacity should be fitted in an easily accessible low section of the pipework system to prevent condensate or oil carry-over build up. These must be drained regularly.

The delivery line should incorporate non-return valves, especially for large capacity systems or where two or more compressors are linked to a common main.

Unloading and control gear piping must be as short as possible.

Gardner Denver Ltd compressors incorporate safety valves at all stages as standard equipment to protect the compressor. They will NOT give protection to downstream piping or equipment. Separate safety valves should be fitted for these areas.

3.5 DRIVE RECOMMENDATIONS

Details of drive arrangements and anti-vibration pad mountings are available from Gardner Denver UK Ltd. An overload device must always be fitted to motors.
Manufacturers terminal box wiring instructions must be observed.
It is recommended that for efficient maintenance scheduling an hours run meter be incorporated on the diesel engine or fitted to the motor starter.

3.6 COOLING

Satisfactory compressor operation depends on correct cooling, which requires positive circulation of cool, clean water, free from suspended particles.

Check water is flowing in mains installations or, if closed circuit, that radiator is full.

It is recommended that a filter be fitted in the inlet water line (mains).

Maximum permitted water pressure within the compressor is 5 bar equivalent to 52 metres of water head.

Cooling water flow rate is determined by temperature rise across the machine adjusted on site to 10°C to 12°C.

Maximum recommended water inlet temperature is 30°C.

It is recommended that temperature gauges are fitted to water inlet and outlet pipes to monitor water temperature (mains).

Water flow rate at 15°C inlet temperature will be 75 l/h/kw approximately (mains).

Prevent overcooling by shutting off flow when compressor is not running (mains).

A Gardner Denver Ltd automatic water valve can be fitted to control water supply when stopping or starting the compressor (mains). If one has been ordered, details will be found in section 10.

Trip arrangements should be fail safe to ensure that compressor will only run on full load for a short period without water flow before shutting down.

During freezing weather conditions, cooling water should be drained from the system if the compressor is not being used (mains) or anti-freeze added to radiator sets to manufacturers specified concentrations.

NOTE:-It is essential that anti-freeze used is suitable for use with neoprene rubber water pump impeller when Jabsco cooling water pump is supplied with compressor or radiator set.

3.7 ELECTRICAL CONNECTIONS

Ensure compressor is installed to comply with local electricity authority stipulations and that necessary electrical work is carried out by a competent electrical engineer. Check electrical requirements for machine with manufacturer before commencing installation wiring.

An overload device must always be fitted to motors.

Manufacturers terminal box wiring instructions must be observed.

An hours run meter fitted to the motor starter/control panel is recommended for efficient maintenance scheduling.

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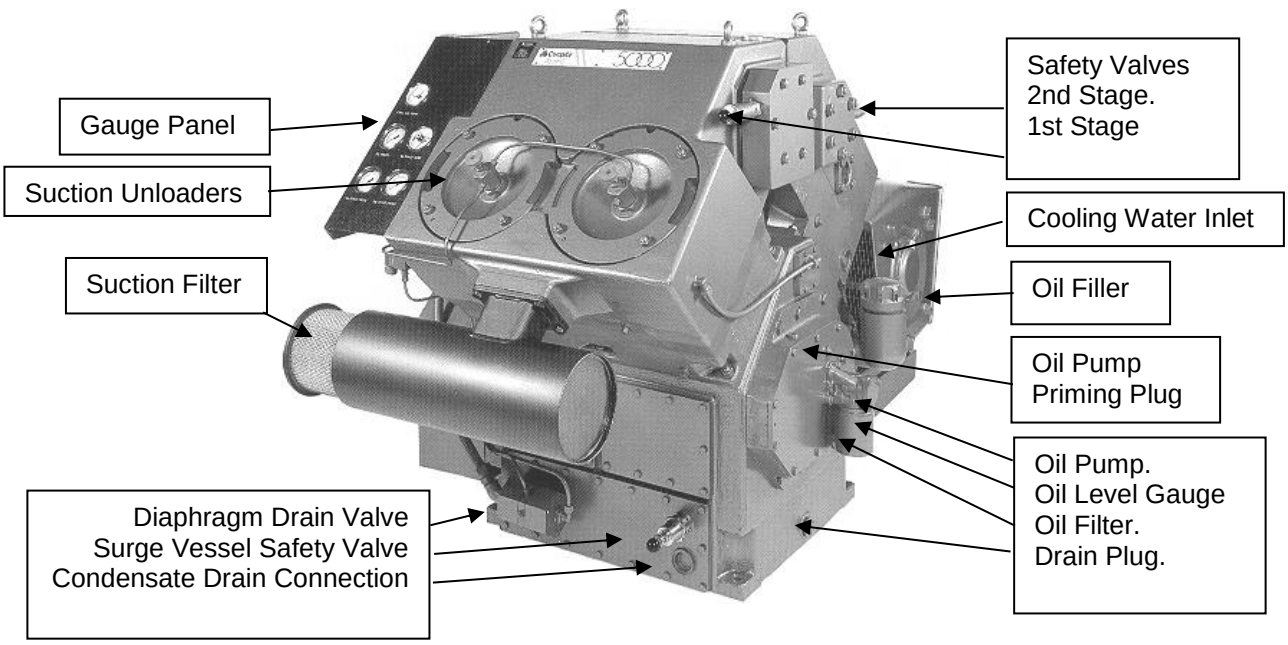
4 COMMISSIONING OR RECOMMISSIONING

WARNING!
BEFORE OPERATING THIS EQUIPMENT USERS SHOULD BE MADE AWARE OF AND ENSURE COMPLIANCE WITH THE HEALTH AND SAFETY REGULATIONS APPROPRIATE TO THIS CLASS OF WORK. ATTENTION OF U.K. USERS IS DRAWN TO THE HEALTH AND SAFETY AT WORK ACT, 1974. & CONTROL OF SUBSTANCES HAZARDOUS TO HEALTH REGULATIONS 1988.

TAMPERING WITH SAFETY VALVES IS DANGEROUS AND ALSO INVALIDATES THE GUARANTEE.



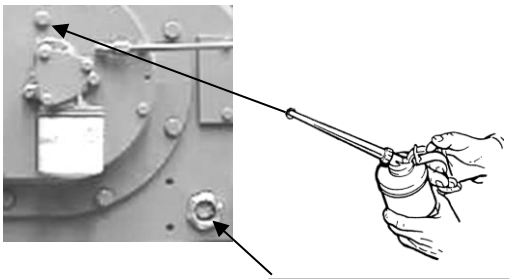
4.1 BEFORE STARTING

Ensure familiarity with safety devices and type of control.

NOTE: Low oil pressure and high air temperature switches are pre set and should not be adjusted.

Ensure suction filter is in good condition and filter element is fitted. Make sure that any protective blank fitted to the first stage suction is removed. Check that silencer bore (if fitted) and any suction pipework is clean before reassembling.

Check that the inside of the crankcase is clean and filled with the correct grade of lubricant until oil level sight glass is up to maximum level. Maintain oil level no lower than sight glass centre line.
Important:- Do not overfill.



Remove plug from outer end cover, above force feed pump and prime with recommended lubricant. Replace plug.
Turn over the compressor at least one revolution by hand, to ensure freedom of movement.

4.2 START-UP PROCEDURE

NOTE:It is not necessary to remove any inhibition lubricant which may have been applied before despatch, unless there are specific instructions attached to the compressor stating otherwise.

Screw down fully the first stage suction unloaders.

Check radiator is topped up on radiator sets or water is flowing in correct volume in mains water installations.

Operate starter.

Check immediately that the direction of rotation is counterclockwise looking on driving end.

Check that oil pressure is above 2 bar.

WARNING!
THE COMPRESSOR SHOULD NOT BE RUN FOR LONGER THAN 30 SECONDS WITH NO OIL PRESSURE.

Check there are no uncharacteristic noises.

Run for 30 minutes unloaded.

Stop and isolate the compressor and release all pressures. Check that outer surface of machine is cool

Remove crankcase doors and check that bearings and running gear are not over-heating. Replace doors, ensuring joints are correctly seated.

Close drain valves and/or replace plugs.

Restart the compressor, unscrew the first stage suction unloaders and bring slowly onto load. Build up to full pressure within 1 hour.

If appropriate, set the compressor for automatic operation.

Check and adjust the control equipment settings, if applicable (for example, pressure switch).

Continue to check that machine is functioning correctly and not over-heating.

Observe stage pressures and temperatures are normal.

Check for air, water or oil leaks.

WARNING!
DO NOT TRY TO CORRECT LEAKS WHEN ITEMS ARE PRESSURIZED.

Ensure the automatic controls (if applicable) are operating correctly.

If machine is manually controlled, open all condensate drains at 30 minute intervals.

Adjust cooling water flow to give 11°C rise across machine.

Run at full load for one and a half hours and record compressor rpm, oil pressure and stage pressures at 30 minute intervals.

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5 OPERATION AND ROUTINE MAINTENANCE

5.1 OPERATION AND GENERAL MAINTENANCE

The commissioning procedure (Section 4) should be used:–

a) For the first commissioning run;
b) Following overhaul;
c) After standing idle for an extended period.

External cleanliness of the compressor pipework and jointing is imperative in order that any leakages may be readily detected. Monitor and record stage pressures and temperatures in order to give advanced warning of any malfunction. Ambient conditions, especially temperatures, will vary readings but they are usually within plus or minus 4%.

Marking the pressure gauge glass at the normal running pressure will allow easy comparisons of pressure to be made.

5.2 STARTING UP

Ensure operator is fully conversant with controls and safety devices.

Check oil level in crankcase and top up if necessary, using recommended oil until sight glass is up to high level mark.

Set stop valves in control pipework correctly.

Ensure trip circuits, if fitted, are correctly set.

Check V belts are in good condition and correctly tensioned. Check APP011.

Check that compressor and ancillary equipment are clear of all loose equipment and tools.

Ensure that there is adequate water in the cooling system (radiator sets) or supply from the mains.

Manually operate suction unloaders if receiver pressure is unavailable to achieve this.

Operate main control or motor starting gear.

As soon as Diaphragm Drain Valves (DDV's) are actuated to load machine, release suction unloaders if previously manually operated.

5.3 RUNNING ON LOAD

Set automatic timer (when fitted) to vent diaphragm drain valves every 30 minutes for 5 seconds duration, or more frequently if high humidity prevails. Contact Gardner Denver Ltd for more details.

Monitor gauges for normal pressures and temperatures.

Check water temperature rise 10°C to 12°C across machine and adjust to suit.

Observe compressor is functioning correctly without undue vibration or noise.

5.4 STOPPING

Stop compressor by depressing stop button on motor control panel. Turn off cooling water flow if no automatic water valve or water pump is fitted. The machine will automatically unload via unloader system.

5.5 STANDING IDLE

The unloaders will automatically be left open.

For ambient temperatures below 0°C protect machine by draining off cooling water system, unless protected by anti-freeze.

After one week standing idle, turn the machine over by hand before starting to ensure it turns freely.

If the compressor is to stand idle for more than four weeks or shorter period if ambient conditions are unfavourable, it is advised to consult Gardner Denver Ltd for correct inhibition procedure.

6 MAINTENANCE SCHEDULE

WARNING!

1. BEFORE PROCEEDING WITH MAINTENANCE ON THE COMPRESSOR IT MUST BE STOPPED AND ISOLATED ELECTRICALLY AND MECHANICALLY AND VISIBLE WARNING NOTICES DISPLAYED.

2. IN ADDITION ALL INTERNAL PRESSURE MUST BE RELEASED WITH THE UNIT ISOLATED FROM THE SUPPLY AND STORAGE RESERVOIR AND THE WATER SUPPLY SHUT OFF.

NOTE:- An O&M manual must cater for a wide variety of operating duties, ambient conditions and methods of control, as well as the use of mineral or synthetic lubricants. Periods given in this manual allow for the worst combination and are also based on preventative maintenance rather than operation until failure occurs.

6.1 GENERAL

It is useful to record pressure, temperatures, oil used etc. in a log against hours run, as this builds up a detailed record of the machine's condition. It can also give an indication of impending problems.

6.2 DAILY

Check oil level in crankcase and top up as necessary.

Check stage pressures, oil pressure and temperatures.

6.3 WEEKLY

Check for oil, air or water leaks, rectify if necessary.

Check correct operation of all controls.

Check all nuts, screws and fittings for tightness.

6.4 AFTER THE FIRST 100 HOURS RUNNING TIME ON MINERAL OIL

Change oil filter. If it is desired to use synthetic lubricant, follow directions below.

6.5 CHANGING OVER FROM MINERAL TO SYNTHETIC LUBRICANT

Compressor components in contact with the lubricant should be as clean as is practical before changing over. This is necessitated by the excellent solvency of synthetic oils which tend to loosen and remove existing deposits.

There are some materials, e.g. certain rubbers, paints, plastics and metals, which are not compatible with synthetic oils. Components on these compressors are synthetic oil compatible but a problem may exist with ancillary equipment. Consult equipment manufacturer to determine compatibility.

1. Drain the old mineral lubricant completely whilst the oil is warm.
2. Thoroughly clean interior of the crankcase. Clean suction strainer.
3. Renew oil filter.
4. Remove, thoroughly clean and refit all valves
5. When inspecting valves, also remove as far as is possible carbon deposits in valve pockets, passageways, pipes and separators.

6.6 SERVICE PLAN

Service Plan - 5236

	Service Kit Number								
	HSK2283	HSK2291	HSK2305	HSK2313	HSK2321	HSK2291	HSK2356	HSK2291	HSK2348
	12 Months From Installation/Last Service Or								
COMMISSION	100	1500	3000	4500	6000	7500	9000	10500	12000	Task	Preparatory Task	Task Description	Parts Provided	Qty
	X	X	X	X	X	X	X	X		1		Change air intake element (air compressor only)	Suction filter element	1
	X	X	X	X	X	X	X	X	X	2		Inspect Belt Tension		
		X	X	X	X	X	X	X	X	2A	OR	Inspect Drive Coupling		
		X	X	X		X	X	X				Inspect corrosion rods		
					X				X	3		Replace corrosion rods	Corrosion rod assy	1
X	X		X		X		X		X	4		Remove crankcase doors	Door joints	4
X	X		X		X		X		X			Clean sump		
X									X	5	+7+4	Replace oil	Mineral lubricant 20 Litres	3
	X		X		X		X			6	+7+4	Replace oil	Synthetic lubricant 20 Litres	2
	X		X		X		X						Synthetic lubricant 5 Litres	1
X	X	X	X	X	X	X	X	X	X	7		ReplaceOil filter	Oil filter	1
		X	X	X	X	X	X	X	X	8		Replace water pump impellor	Impellor kit	1
				X			X		X	9		Remove 2nd stage valve covers	Cover O ring	2
													Cover O ring	2
				X			X			11	+9	Service 2nd stage valves	Valve kit	2
									X	12	+9	Replace 2nd stage valves	Valve assy	2
									X			Inspect 2nd stage pistons		
									X	14		Deglaze 2nd stage liners		
									X	15	+14+9+4	Replace 2nd stage piston rings	Piston ring kit	2
				X			X					Service 2nd stage valves		
									X	16	+14+9+4	Replace 2nd stage small ends	Bearing S/E	2
													Gudgeon pins	2
													Circlips	4

Service Plan - 5236

	Service Kit Number								
	HSK2283	HSK2291	HSK2305	HSK2313	HSK2321	HSK2291	HSK2356	HSK2291	HSK2348
	12 Months From Installation/Last Service Or								
COMMISSION	100	1500	3000	4500	6000	7500	9000	10500	12000	Task	Preparatory Task	Task Description	Parts Provided	Qty
									X	17	+4	Replace 2nd stage big end bearings	Bearing Shells Pairs	2
													Big end bolts	4
				X		*X*			*X*	*18*		*Remove 1st stage valve covers*	*Cover O ring*	*4*
				X		X				20	+18	Service 1st stage valves	Valve kit	2
									X	21	+18	Replace 1st stage valves	Valve assy	2
									X			*Inspect 1st stage pistons*		
									X	22		*Deglaze 1st stage liners*		
									X	23	+22 + 4	Replace 1st stage piston rings	Piston Ring Kit	2
				X		X			*X*			*Inspect 1st stage liners*		
									X	24	+32 + 4	Service 1st stage piston/small ends	Bush	2
													Gudgeon pin	2
													Circlip	4
									X	25	+4	Replace 1st Stage big end bearings	Bearing Shells Pairs	2
													Big end bolts	4
									X			*Inspect cranshaft*		
									X	26	IF FITTED	Service water valve-U231.F	Service kit	1
									X	27		Replace main bearing & oil seal D/E	Bearing bush	1
													Joint	1
													Oil seal	1
									X	28		Replace suction filter silencer	suction filter silencer	1
													suction filter joint	1
									X	29		Remove end cover -oil pump plate O/E	joint end cover	1
									X	30	+29	Replace main brg.O/E	Main bearing bush	1
													joint	1

Gardner Denver
HIGH PRESSURE SOLUTIONS

Service Plan - 5236

	Service Kit Number								
	HSK2283	HSK2291	HSK2305	HSK2313	HSK2321	HSK2291	HSK2356	HSK2291	HSK2348
	12 Months From Installation/Last Service Or								

COMMISSION	100	1500	3000	4500	6000	7500	9000	10500	12000	Task	Preparatory Task	Task Description	Parts Provided	Qty
									X	31	+29	Replace oil pump	Oil pump with coupling & gasket	1
									X	32	+29 IF FITTED	Replace water pump drive chain	chain	1
										33	+29 IF FITTED	Service water pump	seal & impellor kit	1
													Joint-water pump bracket	1
													Joint-water pump	1
													Joint-water pump IN/OUT	2
					X				*X*	*34*		Replace bursting discs (Radiator Set @9000hrs.)	Bursting discs kit	1
					X				*X*	*35*		Replace drain valve diaphragm	Service kit	1
													Joint-drain to surge vessel	4
													Screw seal	2
									X	*36*		Replace diaphragm drain valves &seats	1st valve &seat	1
									X	37		Inspect test 1st stage cooler	Joint-stack to cover fixed end	1
													Joint-stack to cylinder fixed end	1
													O ring floating end	1
													Joint-stack to cover floating end	1
									X	38		Inspect test 2nd stage cooler	Joint-stack to cover fixed end	1
													Joint-stack to cylinder fixed end	1
													O ring floating end	1
													Joint-stack to cover floating end	1
												Test safety valves in accordance with regional requirements		

Service Plan - 5236

	Service Kit Number								
	HSK2283	HSK2291	HSK2305	HSK2313	HSK2321	HSK2291	HSK2356	HSK2291	HSK2348
	12 Months From Installation/Last Service Or								

COMMISSION	100	1500	3000	4500	6000	7500	9000	10500	12000	Task	Preparatory Task	Task Description	Parts Provided	Qty
									X				1st stage	1
									X				2nd stage	1
									X				Surge vessel	1
									X			Test pressure gauges	1st stage	1
									X				2nd stage	1
									X				Oil	1
									X			Test temperature switches	1st stage	1
									X				Final stage	1
									X			Test low oil pressure switch	L.O.P	1
									X			Test non return valve	non return valve	1
									X				Seal	1

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7 DISMANTLING AND REASSEMBLY OF VALVES

7.1 GENERAL

Keep a spare oiled and maintained set of valves in store for quick compressor servicing.

Valves should have a thin carbon layer and be slightly moist with oil.

Valve removal is a simple procedure but the following guidelines should be observed.

NOTE:-Unless replacement of the springs and plates is intended, the order in which these components are removed should be carefully noted so that the valves may be reassembled with the same seating faces in contact.

7.2 CLEANING AND INSPECTION – ALL STAGES

The valve components should be degreased using a suitable solvent and stiff brush. Carbon deposits may be removed scraping with a soft, blunt instrument, e.g. a piece of wood.

WARNING!
GREAT CARE SHOULD BE TAKEN WHEN REMOVING CARBON DEPOSITS TO ENSURE THAT THE SEATING FACES OF THE VALVE COMPONENTS ARE NOT DAMAGED.

These faces should be clean and bright over their whole area, with no evidence of uneven contact. Renew any plates which are indented, cracked, warped, or have wear grooves.

If the seats show severe wear or indentations the complete valve assembly must be renewed. The remaining components should be checked for cracks, distortion or other damage liable to impair valve operation.

7.3 FIRST STAGE VALVES – WITH SUCTION UNLOADERS

7.3.1 REMOVAL

Remove the first stage suction unloader pipework and the nuts securing each of the two valve covers and withdraw the covers from the locating studs using forcing screws in the tapped holes provided in each cover.

Screw valve lifters to each valve and lift from the cylinders. A gentle rocking action pulling at the same time will free the valve from any carbon build up in the pocket.

7.3.2 DISMANTLING

Lay the valve on a clean, flat surface with the unloader fork uppermost. Remove and discard 'O' ring (10). Remove the cap by pulling, unscrew and remove nut (16) and washer (17) and remove unloader fork (13) and spring (14). Unscrew and remove nut (11) whilst holding the valve in a soft jawed vice with just sufficient force to prevent it from turning. The valve can then be removed from the vice and the upper valve body half (15) can be lifted clear of the stud. Remove the delivery plate springs (3), delivery plate (2), lower lift washer (7), suction valve plate (6), middle lift washer (5) and the suction plate springs (4).

7.3.3 REASSEMBLY

Invert upper valve body (15) and place on clean, open vice jaws or a similar support. Place lower lift washer (7) and suction plate (6) on the valve body, engaging them with location pegs (8). Place middle lift washer (5) onto pegs.

Fit suction springs (4) with the angled arms pointing downwards. Align the holes in the springs with location pegs.

Fit delivery springs (3) with angled arms pointing upwards and place in valve body (15) and engage with location pegs (9). Fit delivery plate (2), engaging it with location pegs in the same manner as delivery springs.

Assemble valve body halves by carefully passing central stud of lower valve body (1) through the centre of upper body (15), taking care not to disturb the alignment of the plates and springs. Align holes in lower valve body with the pegs and carefully push the valve body halves together against the spring plate force.

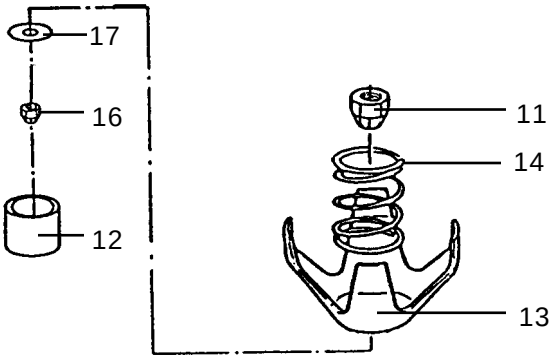
Holding the valve halves together, lift the assembly and fit nut (11). Tighten nut to correct torque.

Replace unloader spring (14), fork (13), washer (17) and nut (16) and tighten to correct torque. Check valve plates for free movement, refit unloader cap (12).

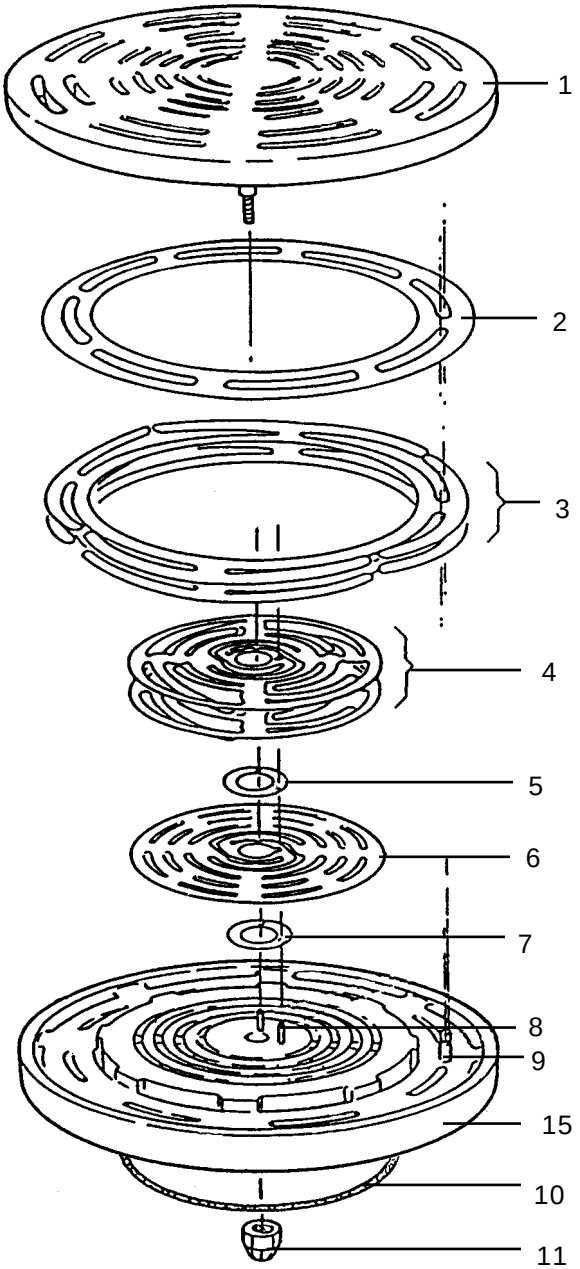
Lightly smear 'O' ring (10) with silicon grease and fit to groove in upper body (15).

7.3.4 REFITTING

Check valve pocket and seat for cleanliness before refitting valve. Fit valve and ensure it is correctly seated by checking that it is free to rotate on its seat. Replace 'O; rings on valve cover if damaged and smear with silicon grease before refitting cover to cylinder. Refit cover retaining nuts and tighten down evenly to correct torque. Replace suction unloader pipework.



Automatic unloader



1st STAGE CONCENTRIC VALVE 98650.1520	
1	Lower Valve Body
2	Delivery plate
3	Delivery plate springs
4	Suction plate springs
5	Middle lift washer
6	Suction Valve Plate
7	Lower lift washer
8	Location pegs
9	Location pegs
10	'O' ring
11	Nut
12	**Unloader Cap**
13	**Unloader Fork**
14	**Unloader Spring**
15	**Upper Body**
16	**Nut**
17	**Washer**

1st STAGE CONCENTRIC VALVE

Note: Valve is shown inverted for ease of assembly

7.4 FIRST STAGE VALVES – WITHOUT SUCTION UNLOADERS

7.4.1 REMOVAL

Remove the nuts securing each of the two valve covers from the locating studs using forcing screws in the tapped holes provided in each cover.

Screw valve lifters to each valve and lift from the cylinders. A gentle rocking action pulling at the same time will help to free the valve if necessary.

7.4.2 DISMANTLING

Lay the valve on a clean, flat surface with the stud and nut uppermost. Remove and discard 'O' ring (10). Unscrew and remove nut (11) whilst holding the valve in a soft jawed vice with just sufficient force to prevent it from turning. The valve can then be removed from the vice and the upper valve body half (12) can be lifted clear of the stud. Remove the delivery plate springs (3), delivery plate (2), lower lift washer (7), suction valve plate (6), middle lift washer (5) and the suction plate springs (4).

7.4.3 REASSEMBLY

Invert upper valve body (12) and place on clean, open vice jaws or a similar support. Place lower lift washer (7) and suction plate (6) on the valve body, engaging them with location pegs (8). Place middle lift washer (5) onto pegs.

Fit suction springs (4) with the angled arms pointing downwards. Align the holes in the springs with location pegs.

Fit delivery springs (3) with angled arms pointing upwards and place in valve body (12) and engage with location pegs (9). Fit delivery plate (2), engaging it with location pegs in the same manner as delivery springs.

Assemble valve body halves by carefully passing central stud of lower valve body (1) through the centre of upper body (12), taking care not to disturb the alignment of the plates and springs. Align holes in lower valve body with the pegs and carefully push the valve body halves together against the spring plate force.

Holding the valve halves together, lift the assembly and fit nut (11). Tighten nut to correct torque.

Lightly smear 'O' ring (10) with silicon grease and fit to groove in upper body (12).

7.4.4 REFITTING

Check valve pocket and seat for cleanliness before refitting valve. Fit valve and ensure it is correctly seated by checking that it is free to rotate on its seat. Replace 'O' rings on valve cover if damaged and smear with silicon grease before refitting cover to cylinder. Refit cover retaining nuts and tighten down evenly to correct torque (see SECTION 2.11).

7.5 SECOND STAGE VALVES

7.5.1 REMOVAL

As 7.3 A. i) except for removal of suction unloader pipework.

7.5.2 DISMANTLING

Remove and discard 'O' ring (7). Unscrew and remove nut (8) whilst holding the valve in a soft jawed vice with just sufficient force to prevent it from turning. The valve can then be removed from the vice and the upper valve body half (9) can be lifted clear of the stud. The delivery valve/backing plates (2), delivery spring plates (3), suction valve spring plates (4) and suction valve plate (5) can then be removed.

7.5.3 REASSEMBLY

Invert upper valve body (9) centrally on open vice jaws or a similar support.

Place suction valve plate (5) on the valve body, engaging locating slot with peg (6). Fit the suction plate springs (4) with the angled arms pointing downwards and align with locating peg. Fit the first delivery valve/backing plate into the recess in the upper valve body. Place delivery valve springs (3) onto valve/backing plate having first positioned them as follows:–

Assemble the delivery plate springs (3) in pairs, rotating one spring in each pair until the inner and outer circumferences are matched perfectly.

Hold the two pairs of springs together with the concave faces facing each other and then rotate one pair until their outer edges touch all round the circumference and there is a constant gap around the inner edge.

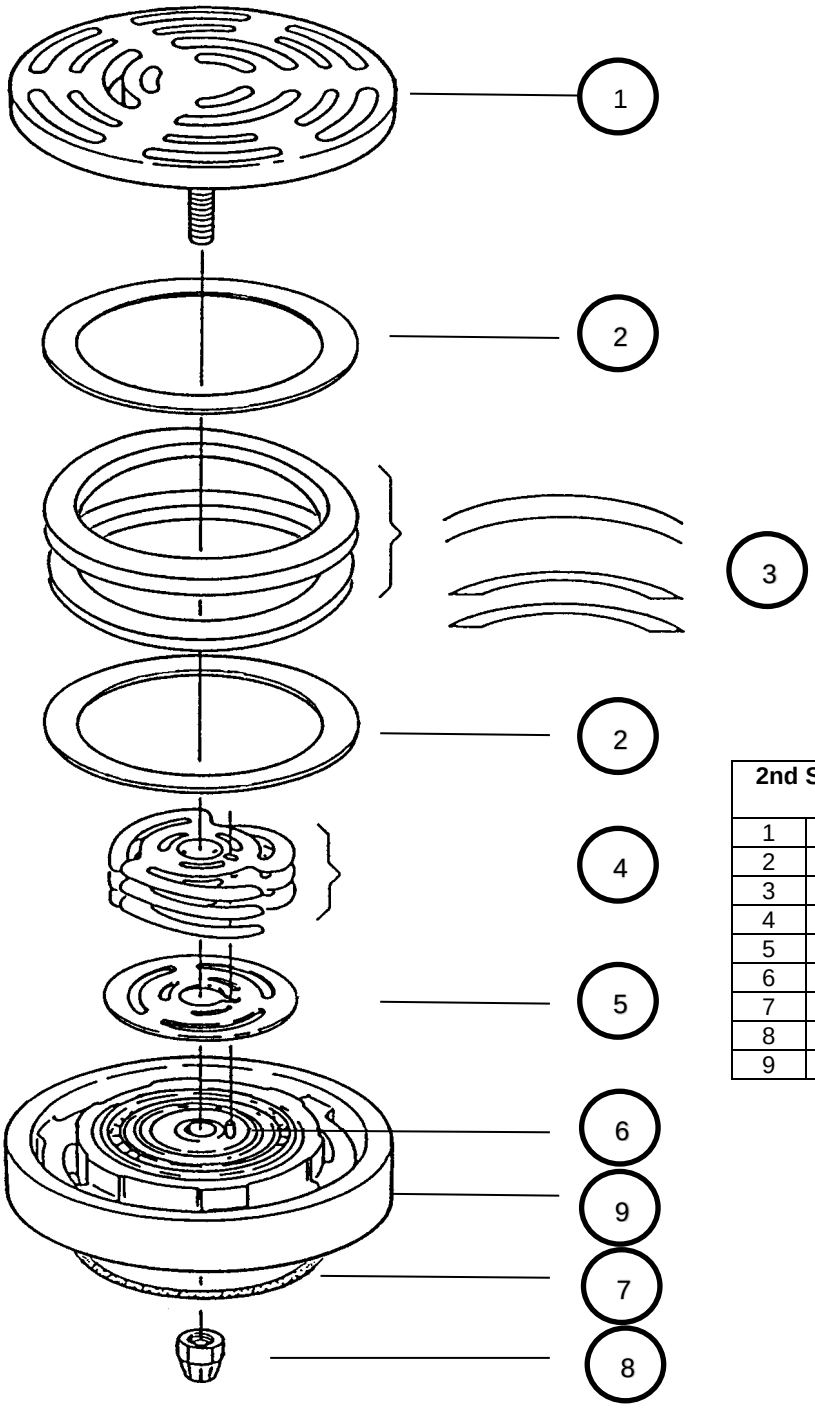
Place second delivery valve/backing plate on valve springs ensuring the plates and springs are correctly aligned, carefully assemble valve body halves by passing central stud of lower body (1) through the centre of upper body, taking care not to disturb the plate and spring positions. Align hole in lower body with peg (6) and carefully push the valve halves together.

Keeping the valve halves firmly engaged remove assembly from the support and fit nut (8). Tighten nut to correct torque, check valve plates for free movement.

Lightly smear new 'O' ring (7) with silicon grease and fit to the upper valve body.

7.5.4 REFITTING

As 7.3 A. iv) except for replacement of suction unloader pipework.



2nd STAGE CONCENTRIC VALVE 98650.1039	
1	Lower Body
2	Delivery Valve/Backing Plates
3	Delivery Spring Plates
4	Suction Valve Plates
5	Suction Plate Springs
6	Peg
7	'O' ring
8	Nut
9	Upper Valve Body

2nd STAGE CONCENTRIC VALVE

Note: Valve is shown inverted for ease assembly

8 FAULT GUIDE

WARNING!
1. BEFORE PROCEEDING WITH MAINTENANCE ON THE COMPRESSOR IT MUST BE STOPPED AND ISOLATED ELECTRICALLY AND MECHANICALLY AND VISIBLE WARNING NOTICES DISPLAYED.
2. IN ADDITION ALL INTERNAL PRESSURE MUST BE RELEASED WITH THE UNIT ISOLATED FROM THE SUPPLY AND STORAGE RESERVOIR AND THE WATER SUPPLY SHUT OFF.

NOTE:– A Safety valve opening indicates excessive pressure and under NO CIRCUMSTANCES must a safety valve be screwed down to accommodate excessive pressure. THIS IS DANGEROUS. If safety valve opens or appears faulty, shut down compressor immediately and investigate.

If fault appears immediately or shortly after a service, first examine those parts disturbed during the service.

Following is a list covering the probable causes of possible operational faults, together with their suggested remedies.

FAULT	PROBABLE CAUSE	RECOMMENDATION(S)
LOW FIRST STAGE PRESSURE	Intake filter element dirty or blocked	Remove, clean and renew element.
	First stage suction/delivery valve fault.	Remove and service valves.
	Gas leakage from compressor system.	Renew parts, joints and seals as necessary.
	Unloader/drain valves not closing.	Check solenoid valves are operating correctly and the drain valves seat properly. Check that operating gas pipework is not damaged or blocked at 1st stage separator end. Renew diaphragms and valves if necessary.
	Pressure gauge restriction.	Ensure pressure gauge snubber is not blocked. Check calibration of pressure gauge.
	Vee belt drive slipping.	Check and re-tension vee belts.
1ST STAGE SAFETY VALVE BLOWING AND/OR HIGH FIRST STAGE PRESSURE	Faulty safety valves.	Replace safety valve.
	'O' ring failure.	Renew 'O' rings on 2nd stage valve cover.
	2nd stage suction valves faulty.	Service valves.
2ND STAGE SAFETY VALVE BLOWING	Restriction in non-return valve, pressure switch fault, pipeline blockage.	***Existing Installation:*** Check functioning and setting of all control valves, clean pipeline filters and service elements. Check operation of pressure switch. ***New Installations:*** Ensure all protective plugs are removed from ports and control valves are set correctly. Ascertain pipework is of adequate dimensions with minimum of bends, check joint gaskets for correct positioning and size. Check operation of pressure switch.
COMPRESSOR RUNS LONGER TO ACHIEVE SYSTEM PRESSURE	Check LOW FIRST STAGE PRESSURE symptoms.	
	Piston ring wear.	Check components, renew rings and liners on 1st and 2nd stages as necessary. Check blowby on crankcase breather pipe.
OVERHEATING	Incorrect grade of lubricant.	Drain, clean and refill with correct lubricant. Check condition of valves and air passageways.
	Insufficient water flow, reduced cooling efficiency.	Examine condition of water circuit, remove sludge or scale.
OVERHEATING – R ADIATOR SETS	Water pump faulty or drive slipping. Insufficient water flow.	Renew pump, re-adjust drive, add inhibitor.
	Incorrect siting.	Resite to give correct cooling airflow.
	Radiator blocked.	Clean and blow out.
LOW OIL PRESSURE	Oil filter blocked	Fit new oil filter element.
	Worn bearings.	Check bearing clearances.
	Bearing end plate gasket distorted partially blocking suction port.	Examine gasket, replace if necessary.
	Loose pipe couplings in crankcase.	Trace and rectify.
	Loose big end bearing bolts or incorrectly fitted big end bearings.	Examine and retighten to correct torque.
CUTS OUT ON START UP	Overload set too low.	Consult competent electrician.
	Insufficient electrical supply causing low voltage.	Consult competent electrician.

FAULT	PROBABLE CAUSE	RECOMMENDATION(S)
	Star/Delta timer.	Full speed should be obtained by star before switching to delta. Extend timer period to suit.
	Low oil pressure switch operating.	Consult fault symptom 'LOW OIL PRESSURE' or reset star/delta timer.
UNUSUAL NOISE (ON LOAD)	Loose components.	Trace and rectify.
	Gas leaks (usually hissing or whistling).	Trace, stop compressor, depressurise, renew seal.
	Worn bearings, cylinders and rings (usually heavy knocking, rumbling or slapping).	Check clearances and renew as necessary.
UNUSUAL NOISE (UNLOADED)	Piston knocking	Check top dead centre clearance.
	Compressor set-up or pipework system vibration.	Check compressor pipework system is firmly secured, check clearances and alignment of couplings and tension of vee belts.
HIGH OIL CONSUMPTION	Incorrect grade of lubricant.	Change to recommended lubricant.
	Piston rings/cylinder worn or damaged.	Check for wear and renew as necessary. When renewing, break glaze on cylinder walls.
	Excessive unloaded running.	Reduce unloaded running periods.
PREMATURE WEAR	Faulty intake pipeline filter.	Check to ensure filter element is fitted and ensure it fits well.
	Incorrect lubricant.	Change to recommended lubricant.

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9 DRAWINGS

The following drawings contain all items used in the construction of the compressor.

Number	*Drawing Ref*	*Description*
D01	C5236.MK2	5236 MK2 AIR COMPRESSOR
D02	C204482	PIPE ASSY-WATER TRANSFER
D03	D100973.4	2ND STG SUCTION PIPE ASSY
D04	D100973.5	PIPE ASSY-WATER TRANSFER
D05	D101719	1ST STG RUNNING GERA
D06	D101849	OIL PUMP ASSY-NOT WATER PUMP VERSION
D07	D102229	1ST STG COOLER ASSY
D08	D102230	2ND STG COOLER ASSY
D09	D102282	2ND STG RUNNING GEAR PARTS
D10	E62272	CRANKCASE ASSY
D11	E62273	CRANKCASE PARTS-AIR MACHINE
D12	E62274	1ST STG CYL PARTS
D13	E62275	2ND STG CYL PARTS
D14	E62276	E62276-DRAIN SYSTEM PARTS
D15	E62277	E62277-DRAIN CONTROL PIPING PARTS
D16	E62278	E62278-GAUGE PANEL PIPING PARTS

These drawings are attached as part of this pdf file, to locate the drawings please open the attachments navigation pane by clicking View -> Show/Hide -> Navigation Panes –Attachments, or by clicking on the paperclip icon ( ) on the sidebar.

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10 APPENDIX

				COMPRESSOR LOG SHEET						REF NO:		
COMPRESS0R				PRIME MOVER			INSTALLED AT:			OIL GRADE USED:		
TYPE:				TYPE:						CHECK OIL LEVEL		
SPEED:				POWER:						CHECK WATER IN/OUT		
SERIAL NO				DRIVE:			DATE INSTALLED:			CHECK COOLING FAN		
DATE	TIME	HRS RUN	STAGE TEMP °C	DELY TEMP °C	STAGE PRESSURES BAR / PSI				DELY PRESS. BAR/PSI	SERVICE PLAN NUMBE	REMARKS. SEE OVER	SIGNED
		50/100			1	2	3	4				
		500										
		1000										
		1500										
		2000										
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		10000										
		10500										
		11000										
		11500										
		12000										
		12500										

LOGSHEET

DATE	REMARKS	DATE	REMARKS

WARRANTY CLAIM FORM

Customer:	**Claim Date:**
	Customer Claim Number:
	Gardner Denver Number:
Site:	**Agent:**
Address: (If different delivery address please state otherwise)	**Contact:**
	Tel No:
	Fax No:
	E-Mail:
Serial No:	**Date of Commissioning:**
Model No:	**Date Despatched:**
Hours Run:	**Warranty End Date:**
Customer Order No:	**Maximum Cost Approved:**

This form is to be completed & emailed to Gardner Denver Central Quality Department. **Email: quality.redditch@gardnerdenver.com.** All parts to be returned to Gardner Denver unless otherwise instructed. Should failed parts not be returned within 60 days of the date of the claim, Gardner Denver shall reserve the right to charge for the parts replaced.

Authorisation to Proceed	Yes		No		Signed:	Date:

Detailed description and images of fault:

(This must include, who identified problem, what was seen, where on the machine the issue is, when was it found, why was the problem found)

(If details are incomplete, replacements parts could be delayed and the claim rejected)

WARRANTY CLAIM FORM

Parts Used

Part Description:	Part Number: (if available)

Precise details of work done: (Including time taken)

(If details are incomplete, replacements parts could be delayed and the claim rejected)

For Gardner Denver Internal use only.

Warranty claim code, original cause of warranty claim: A - Failures of GD product where reasons cannot be allocated to others. B - External Suppliers C - Manufacturing D - Goodwill E - Design F - Service G - Sales, Contracts or Project Engineering H - Special Reason X - Uncategorised, cause not proven.	Warranty Claim Code:
	Warranty Claim Closed: Yes / NO
	Cost of Parts £
	Cost of Labour £
	Cost of Travel £
	Total Cost £
Approved:	Date:

STANDARD TERMINAL WIRING NUMBERS

WHEN THE MOTOR AND / OR STANDARD COMPRESSOR CONTROL DEVICES HAVE BEEN PRE-WIRED INTO LOCAL MARSHALLING BOXES OR DIRECTLY INTO A STARTER / CONTROL PANEL, THE FOLLOWING TERMINAL NUMBERS ARE USED. ALL OTHER TERMINALS ARE AS SPECIFIC CONTRACT DRAWINGS

STANDARD TERMINAL IDENTIFICATION FOR SET WIRING			
DEVICE	***TERMINAL NUMBER***	***DEVICE***	***TERMINAL NUMBER***
MAINS SUPPLY	L1, L2, L3 N	INLET SOLENOID	37, 38
EARTH	E	LOW INLET TEMPERATURE	39, 40
D.O.L. MOTOR	U, V, W	HIGH INLET TEMPERATURE	41, 42
STAR DELTA MOTOR	U1, V1, W1, U2, V2, W2	NOT USED	43, 44
FINAL DELIVERY PRESSURE SWITCH (CONTROL)	1, 2	CRANKCASE/SUMP HEATER	45, 46
LOW OIL PRESSURE	3, 4	MOTOR ANTI CONDENSATION HEATER	47, 48
4TH STAGE TEMPERATURE	5, 6	DRYER 1phase	L=49 N=50
SUCTION UNLOADING SOLENOID	7, 8	DRYER 3phase	L1=51 L2=52 L3=53 N=54
DDV SOLENOID	9, 10	MOTOR THERMISTOR	TH1 = 55 TH2 = 56
DEMISTER SOLENOID	11, 12	NOT USED	57, 58
1ST STAGE TEMPERATURE	13, 14	EMERGENCY STOP	59, 60
2ND STAGE TEMPERATURE	15, 16	FLOW SWITCH	61, 62
NOT USED	17, 18	NOT USED	63, 64
TRACE HEATING	19, 20	WATER TEMPERATURE	65, 66
3RD STAGE TEMPERATURE	21, 22	TRANSFER SWITCH	67, 68
FINAL DELIVERY TEMP	23, 24	RECLAIM SWITCH	69, 70
1ST STAGE PRESSURE	25, 26		
2ND STAGE PRESSURE	27, 28		
3RD STAGE PRESSURE	29, 30		
4TH STAGE PRESSURE	31, 32		
LOW INLET PRESSURE	33, 34		
HIGH INLET PRESSURE	35, 36		

Gardner Denver

HIGH PRESSURE SOLUTIONS

The Perfect Start

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Designed for Integration

Perfect With Pressure

Compact, maintainable, and designed for integration. Perfect your start with Reavell

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- Greater air output from a 25% smaller footprint than the closest competitor

Maximum Uptime

- Easy maintenance built in
- Single tool valve replacement

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- ATEX certified, 3.1 Material certificates, operation below 0°C ambient
- Market leading 1,500 hour service intervals

Specialist Support

- Bespoke training packages

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For more than 155 years, Gardner Denver has been a leading global provider of compressors, blowers and vacuum pumps. OEMs and end-users from every corner of the world rely on us for their business solutions.

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Claybrook Drive, Redditch, Worcestershire, B98 0DS, UK

T: +44 (0) 1527 838 600, F: +44 (0) 1527 838 630

E: highpressure@gardnerdenver.com

W: www.gdhighpressure.com

For additional information please contact Gardner Denver or your local representative.

Specifications subject to change without notice.

G7 75GB

Gardner Denver

HIGH PRESSURE SOLUTIONS

Reavell

Section 3

Drawings

TP #	DESCRIPTION	CONNECTION
TP1	INLET SUCTION SILENCER	N/A INLET SILENCER
TP2	FINAL DELIVERY	1" NPT (F)
TP3	WATER INLET	32mm HOSE ADAPTOR
TP4	WATER OUTLET	32mm HOSE ADAPTOR
TP5	CONDENSATE OUTLET	38mm HOSE ADAPTOR
TP6	OIL DRAIN	3/4" BSPP (PLUGED)

Discription	Drawing No
P & I Diagram	D74712
Single Line Diagram	D74711
Starter Control Panel	Y/98520.2032

Loose Items

Part No:	Description	Quantity
98156.3666	ADAPTOR 1 NPT(F) / 1 BSP(M)	2
98524.1269.10-80	STD WIKA PRESSURE SWITCH 10-80 BARG G1/4	1
98650.1759	PRESSURE MAINTAINING VALVE 0-70 BAR	1
98660.1157	WASHER 1"BSP COPPER	2
Y/98520.2032	S/C PANEL S/D 30KW 460/3/60 - 110V 5236	1
98418.1015	AV MOUNT 2 YELLOW 1 WHITE SPOT	4

Compressor Characteristics

Description	Value
Media	Air
Flow	189 m³/hr
Working Pressure	17 BarG
Motor Speed	1760 RPM
Compressor Speed	1073 RPM
Motor Power	30kW
Mains Voltage	460V/3Ph/60Hz
Control Voltage	110V/1Ph/60Hz
Approximate Weight	TBC KG's
Cooling Water Flow	2250 Litres/Hr

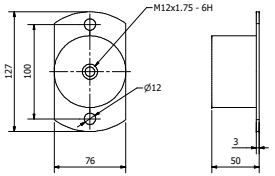
PARTS LIST

ITEM	PART NUMBER	DESCRIPTION	QTY
1	98241.1173	TERMINAL BOX 120x122x91	1
2	98288.1014	THERMOMETER -30 TO +80C, 1/2"BSPP	2
3	98288.1133	PRESSURE GAUGE - 0-40 BAR ST/STL	1
4	98650.1759	P.M.V. 1" BSPP	1
5	98650.1754	SOLENOID VALVE - 110V/1PH/60Hz	1
6	PS2197.4	SOLENOID VALVE 12 BAR 110V-60HZ	1
7	98262.1010	FILTER SILENCER ASSEMBLY	1
8	D101849	OIL PUMP ASSEMBLY	1
9	98650.1185-6.3	SAFETY VALVE-3/4"BSPT 6.3 BAR	1
10	C200659	DRAIN VALVE ASSEMBLY	1
11	98281.1002	SIGHT LEVEL WINDOW	1
12	98262.1147	OIL FILTER WITH FILLER	1

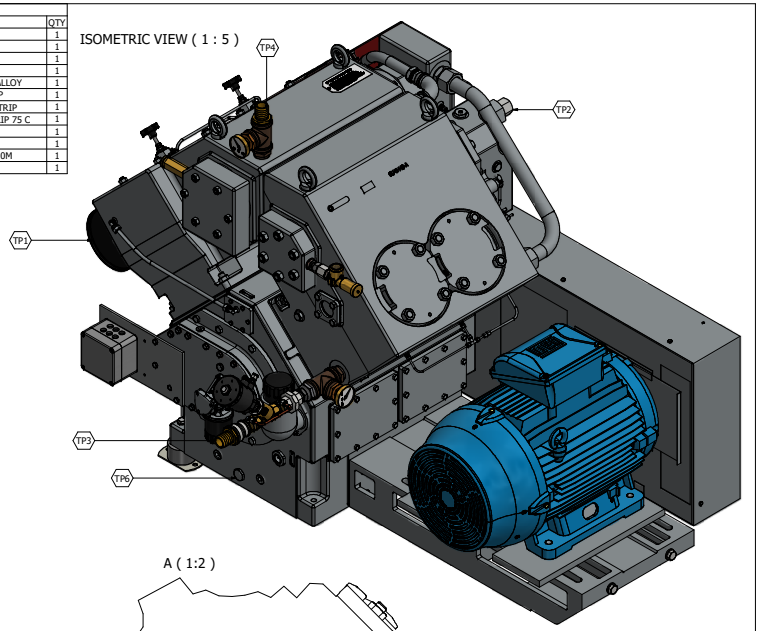
PARTS LIST

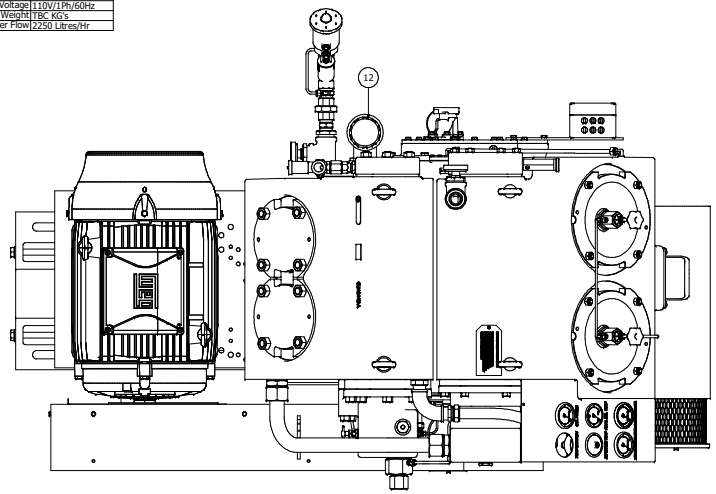
ITEM	PART NUMBER	DESCRIPTION	QTY
13	98650.1011	SAFETY VALVE 2.1 BAR 1"BSPP	1
14	C202291	HAND UNLOADER	1
15	U334.L-5236	DIAPHRAGM DRAIN VALVE	1
16	98288.1026	GAUGE-0-10 BAR 1/4" BSPP	1
17	98288.1028	GAUGE - 0-6 BAR 1/4" BSPP COPPER ALLOY	1
18	98524.1042	LOW OIL PRESSURE SWITCH-1/4"BSPP	1
19	C202556.5	TEMPERATURE CONTROLLER - 170 C TRIP	1
20	C202960.1	INDICATING TEMP. CONTROLLER - TRIP 75 C	1
21	E60253	VEE BELT GUARD	1
22	98650.2584.1	WATER VALVE	1
23	Y/98412.1821	MOTOR 30KW 460/3/60 IE3 4P B3L 200M	1
24	Y/98650.3045	P.S.V 19 Bar.G 1/2" IN, 3/4" OUT	1

AV MOUNT DETAIL (1 : 2)

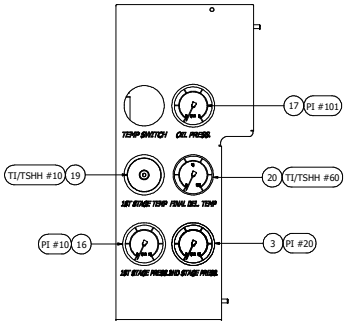


ISOMETRIC VIEW (1 : 5)

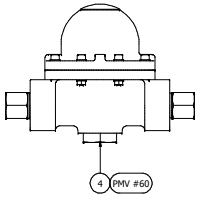




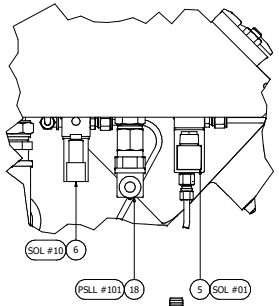
GAUGE PANEL VIEW (1 : 3)

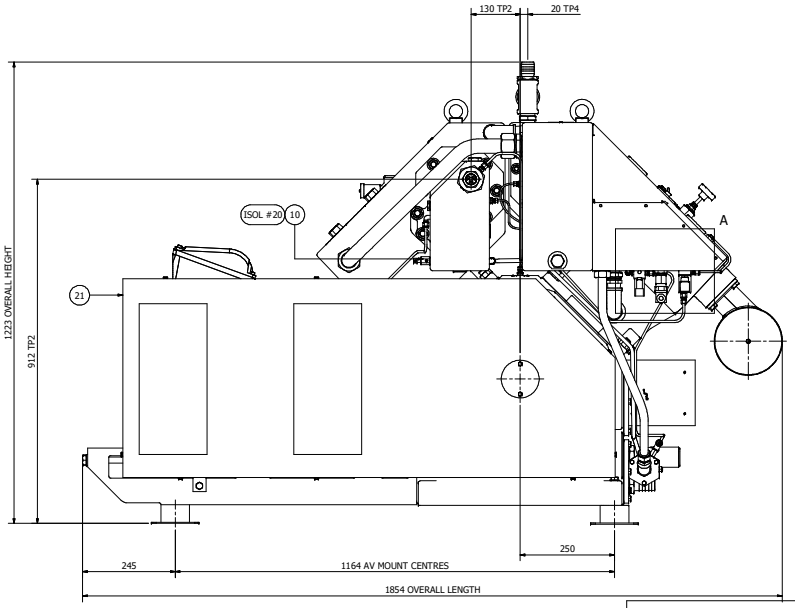


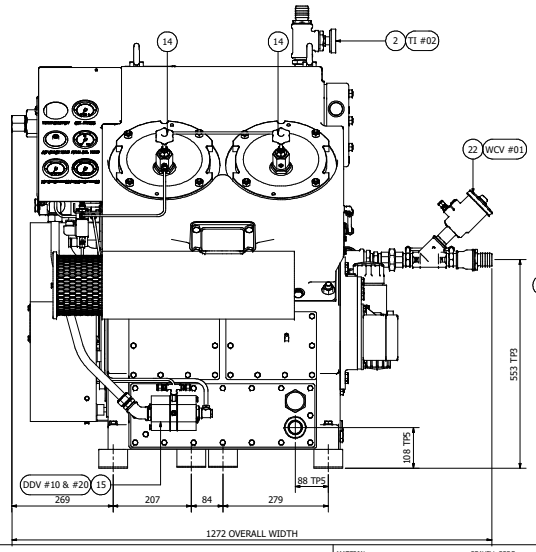
PMV DETAIL (1:3)
LOOSE

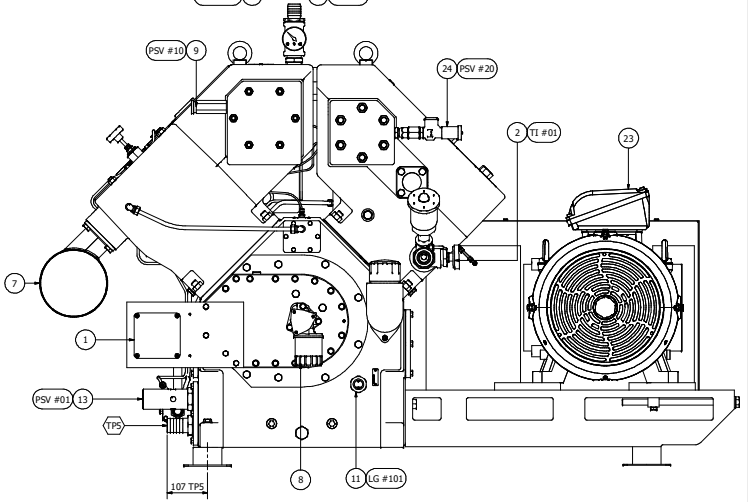


A (1:2)









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DO NOT SCALE - IF IN DOUBT ASK

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THIRD ANGLE PROJECTION

MATERIAL
MATL. SPEC.
REAVELL CODE
PATTERN No.

MANUFACTURING TOLERANCES TO BE AS FOLLOWS UNLESS OTHERWISE STATED
MACHINED ± 0.3 ANGULAR ± 0.5°
FABRICATED ± 1.5 CAST BS6615 CT9
DIMENSIONS IN MILLIMETRES SURFACE TEXTURE VALUE IN MICROMETRES
MACHINE WHERE MARKED..... REMOVE SHARP EDGES

SCALE (A3 PLOT) 1:5
PRODUCT 5236
JOB No. 4072412

DRAWN	T.Chaplin	13/08/2019
REVISED	T.Chaplin	09/04/2020
APPROVED	T.Chaplin	09/04/2020
ISSUE DATE		09/04/2020
LAST MOD No.		1133266

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REDDITCH
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UNITED KINGDOM
TEL: +44 (0) 1527 838 200
www.gardnerdenver.com

GENERAL ARRG'T 5236 M-V-A-M

GD USA

SHT No.	PHASE	DRAWING No.	ISSUE
1 OF 1 SHTs	IP	A42506	B

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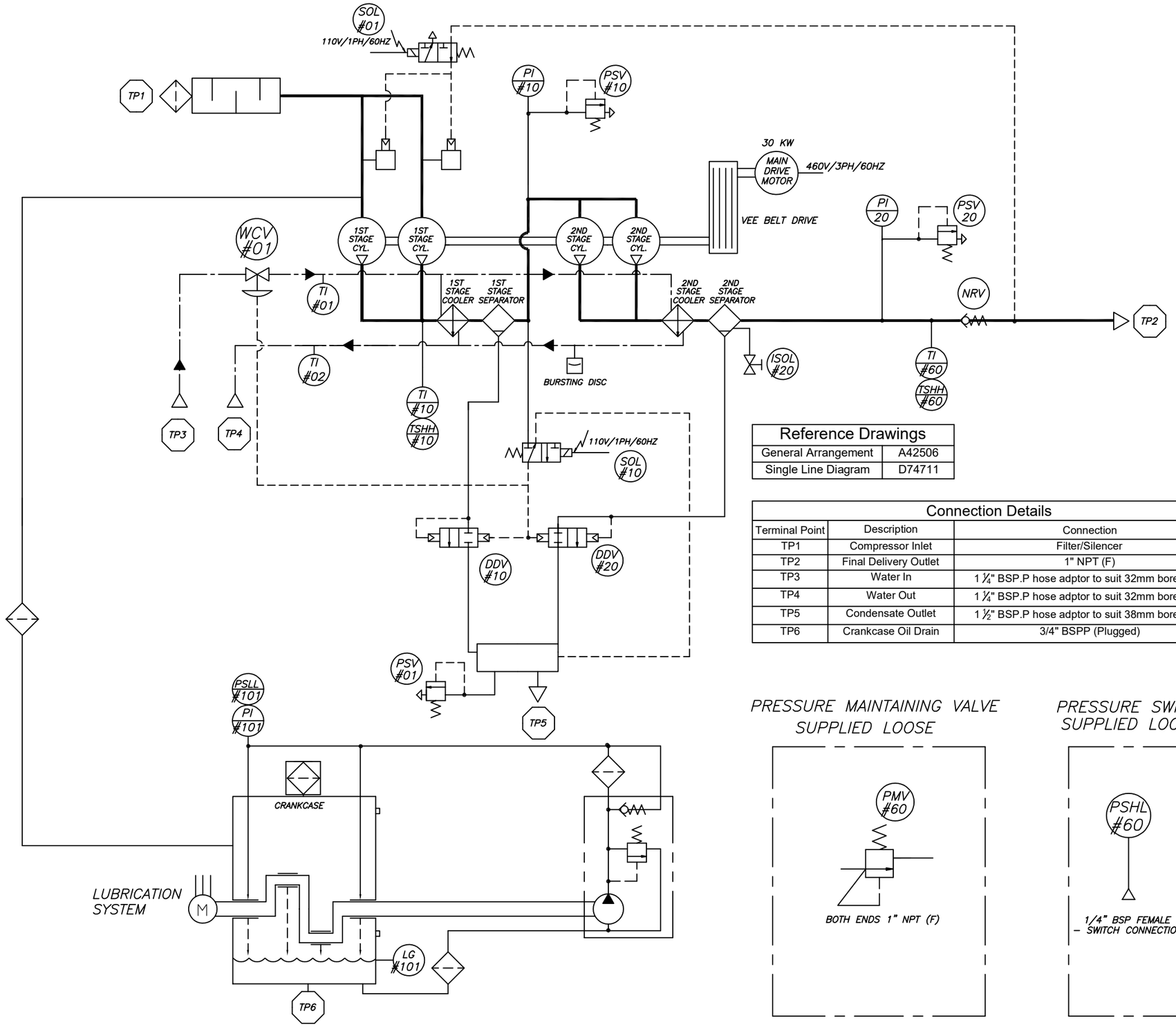
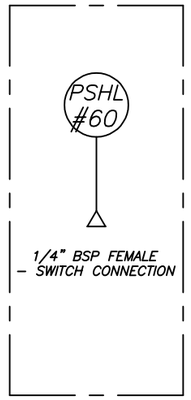


Reference Drawings	
General Arrangement	A42506
Single Line Diagram	D74711

Connection Details		
Terminal Point	Description	Connection
TP1	Compressor Inlet	Filter/Silencer
TP2	Final Delivery Outlet	1" NPT (F)
TP3	Water In	1 ¼" BSP.P hose adptor to suit 32mm bore hose
TP4	Water Out	1 ¼" BSP.P hose adptor to suit 32mm bore hose
TP5	Condensate Outlet	1 ½" BSP.P hose adptor to suit 38mm bore hose
TP6	Crankcase Oil Drain	3/4" BSPP (Plugged)

PRESSURE MAINTAINING VALVE SUPPLIED LOOSE

PRESSURE SWITCH SUPPLIED LOOSE



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MATERIAL
MATL. CODE PATTERN No.

THIRD ANGLE PROJECTION

STATUS SIZE A2L–D
LOCATION
SOFTWARE AutoCAD 2013
VAULT PROFFESIONAL 2013

GENERAL MANUFACTURING TOLS TO BE AS FOLLOWS
MACHINED ±0.3 ANGULAR ±0.5°
FABRICATED ±1.5 CAST BS6615 CT9
DIMENSIONS IN MILLIMETRES
MACHINE WERE MARKED..... ✓ REMOVE SHARP EDGES
SURFACE TEXTURE VALUE IN MICROMETRES

SCALE (A2 PLOT) NONE
PRODUCT 5236
JOB No. 4072412

DRAWN R Taylor 04/07/2019
REVISED
APPROVED T.Chaplin 04/07/2019
ISSUE DATE 04/07/2019
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P & I DIAGRAM 5236 M–V–A–M

GD USA

PHASE	DRAWING No.	ISSUE
IP	D74712	A

TEMPERATURE SWITCH 1ST STAGE

TSHH #10

TEMPERATURE SWITCH FINAL DELIVERY

TSHH #60

PRESSURE SWITCH LUBE OIL LOW

PSLL #101

DDV SOLENOID VALVE 110V/1PH/60Hz

SOL #10

INLET SOLENOID VALVE SUCTION UNLOADERS 110V/1PH/60Hz

SOL #01

PRESSURE SWITCH FINAL DELIVERY

PSHL #60

MAINS MOTOR 30KW

MOTOR 460V/3PH/60Hz

TB #101
TERMINAL BOX

CONTROL PANEL
Y/98520.2032

MAINS VOLTAGE
460V/3PH/60Hz

Reference Drawings	
General Arrangement	A42506
P & I Diagram	D74712

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WIRED BY CUSTOMER
NOT IN GARDNER DENVER SCOPE OF SUPPLY

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STATUS SIZE A1L–E
LOCATION
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VAULT PROFFESIONAL 2013

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FABRICATED ±1.5 CAST BS6615 CT9
DIMENSIONS IN MILLIMETRES SURFACE TEXTURE VALUE IN MICROMETRES
MACHINE WERE MARKED..... ✓ REMOVE SHARP EDGES

SCALE (A1 PLOT)
PRODUCT 5236
JOB No. 4072412

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REVISED
APPROVED T.Chaplin 04/07/2019
ISSUE DATE 04/07/2019
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SINGLE LINE DIAGRAM 5236 M–V–A–M
GD USA

SHT No. 1 OF 1 SHTs	PHASE IP	DRAWING No. D74711	ISSUE A

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HIGH PRESSURE SOLUTIONS

Reavell

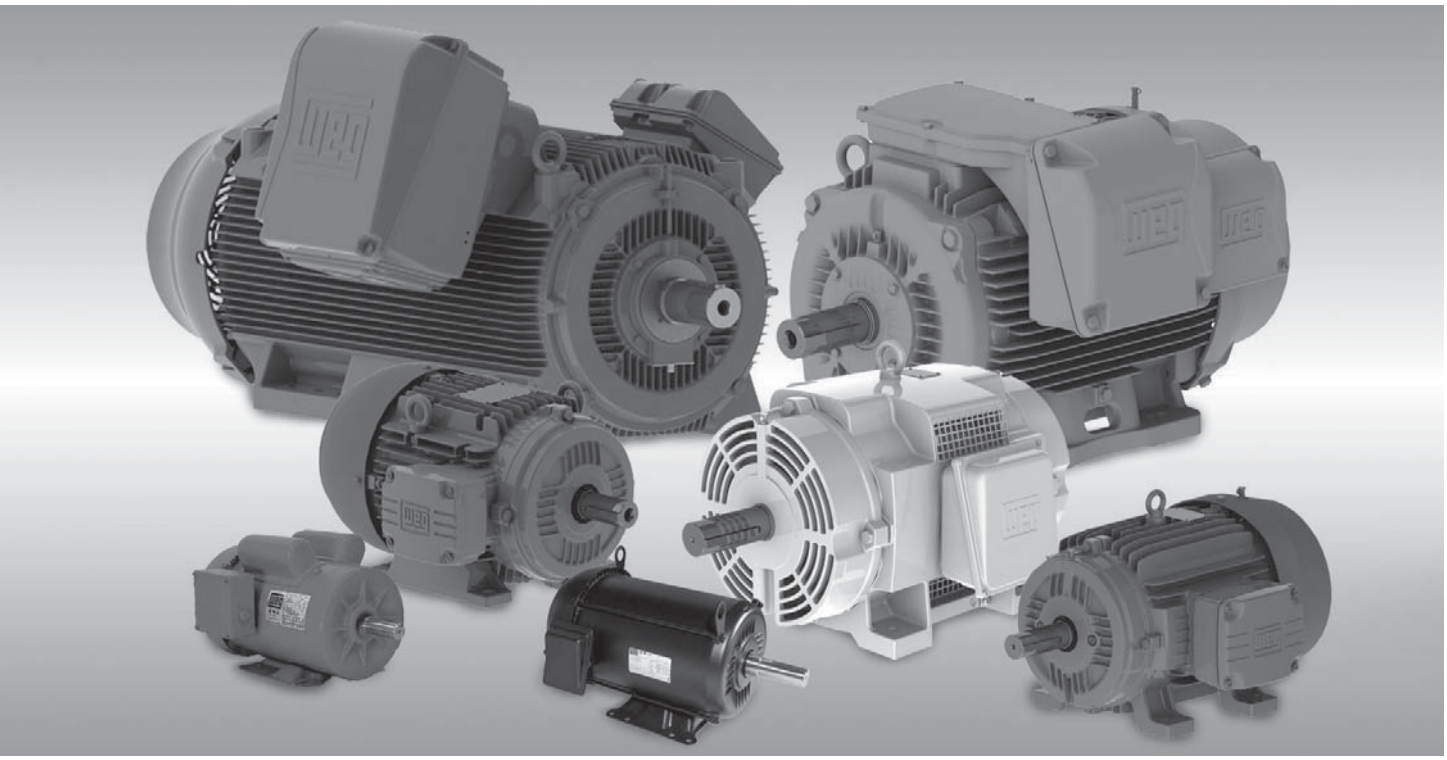
Section 4

Motor

Motors | Automation | Energy | Transmission & Distribution | Coatings

Low and high voltage electric motors

Instructions manual for installation, operation and maintenance of electric motors



ENGLISH

TABLE OF CONTENTS

1. FOREWORD

The installation, operation and maintenance of the motor must be always performed by qualified personnel using proper tools and methods and following the instructions contained in the documents supplied with the motor.

The instructions presented in this document are valid for WEG motors with the following characteristics:
- Three-phase and single-phase induction motors (squirrel cage rotor);
- Three-phase permanent magnet motors;
- Three-phase hybrid motors (squirrel cage rotor + permanent magnets);

The objective of this manual is to provide important information, which must be considered during the shipment, storage, installation, operation and maintenance of WEG motors. Therefore, we advise to make a careful and detailed study of the instructions contained herein before performing any procedures on the motor. The noncompliance with the instructions informed in this manual and others mentioned on the website www.weg.net voids the product warranty and may cause serious personal injuries and material damages.

Electric motors have energized circuits and exposed rotating parts which may cause injuries to people.

2. SHIPMENT, STORAGE AND HANDLING

Check the conditions of the motor immediately upon receipt. When any damage is noticed, this must be reported in writing to the transportation company, and immediately communicated to the insurance company and to WEG. In this case, no installation job can be started before the detected problem has been solved.
Check if the nameplate data matches the invoice data and the environmental conditions in which the motor will be installed. If the motor is not immediately installed, it must be stored in a clean and dry room protected against dust, vibrations, gases and corrosive agents, and with relative humidity not exceeding 60%.
In order to prevent water condensation within the motor during the storage period, it is recommended to keep the space heater ON (where provided). In order to prevent oxidation of the bearings and ensure an even distribution of the lubricant, rotate the motor shaft at least once a month (at least five turns), always leaving it in a different position.
For bearings with oil mist lubrication systems, the motor must be stored horizontally, independently from the mounting configuration, with ISO VG 68 oil in the bearing, (the amount is indicated in the motor manual available on the website www.weg.net) and the shaft must be turned weekly. If the motors are stored for more than two years, it is recommended to change the bearings, or to remove, wash, inspect and relubricate them before the motor is started. After this storage period, it is also recommended to change the start capacitors of single-phase motors since they loss their operating characteristics.

Handle the motor always carefully in order to prevent impacts and damages to the bearings and always install the shaft transportation/locking device (if supplied) when transporting the motor. Use only the eyebolts to lift the motor. However these eyebolts are designed for the motor weight only. Thus never use these eyebolts to lift the motor with additional loads coupled to it. The lifting eyebolts of the terminal box, fan cover, etc., are intended to handle only these parts when disassembled from the motor. Additional information regarding the maximum allowable angle-of-inclination is indicated in the general manual available on the website www.weg.net.

Periodically and mainly before the initial star-up, measure the insulation resistance of the motor winding. Check the recommended values and the measuring procedures in the website.

3. INSTALLATION

During the installation, the motors must be protected against accidental energization. Check the motor direction of rotation, turning it without load before it is coupled to the load.

Remove the transportation devices and shaft locking device (if supplied) before starting the motor installation. Motors must be only installed in places compatible with their mounting features and in applications and environments for which they are intended.
Those motors with feet must be installed on bases duly planned in order to prevent vibrations and assure perfect alignment. The motor shaft must be properly aligned with the shaft of the driven machine. Incorrect alignment, as well as improper belt tension, will certainly damage the bearings, resulting in excessive vibrations and even causing the shaft to rupture. The admissible shaft radial and axial loads indicated in the general manual of the website must be respected. Use flexible coupling whenever possible.
When motors are fitted with oil lubricated bearings or oil mist lubrication systems, connect the cooling and lubrication tubes (where provided). Only remove the corrosion protection grease from the shaft end and flange immediately before the motor installation.
Unless specified otherwise in the purchase order, WEG motors are dynamically balanced with “half key” and without load (uncoupled). The driving elements, such as pulleys, couplings, etc., must be balanced with “half key” before they are mounted on the shaft of the motors.
Observe the correct assembly position of the drains as indicated in the manual on the website www.weg.net.

Do not cover and block the motor ventilation openings. Ensure a minimum clearance of ¼ (25%) of the diameter of the air intake of the fan cover from the walls. The air used for cooling the motor must be at ambient temperature, limited to the temperature indicated on the motor nameplate.

Motors installed outdoors or in the vertical position require the use of additional shelter to protect them from water; for instance, use of a drip cover.

To prevent accidents, ensure that the grounding connection has been performed according to the applicable standards and that the shaft key has been securely fastened before the motor is started.

Connect the motor properly to the power supply by means of safe and permanent contacts, always considering the data informed on the nameplate, such as rated voltage, wiring diagram, etc.

For power cables, switching and protection devices dimensioning, consider the rated motor current, the service factor, and the cable length, among others. For motors without terminal block, insulate the motor terminal cables by using insulating materials that are compatible with the insulation class informed on the nameplate. The minimum insulation distance between the non-insulated live parts themselves and between live parts and the grounding must be: 5.5 mm for rated voltage up to 690 V; 8 mm for voltages up to 1.1 kV; 45 mm for voltages up to 6.9 kV; 70 mm for voltages up to 11 kV and 105 mm for voltages up to 16.5 kV.

In order to assure the degree of protection, unused cable inlet holes in the terminal box must be properly closed with blanking plugs having and equal or higher degree of protection to that indicated on the motor nameplate.

The motor must be installed with overload protection devices. When motor is fitted with temperature-monitoring devices, they must be connected during the operation and even during tests.
Ensure the correct operation of the accessories (brake, encoder, thermal protection, forced ventilation, etc.) installed on the motor before it is started.

Motors fitted with Automatic Thermal Protectors will reset automatically as soon as the motor cools down. Thus, do not use motors with Automatic Thermal Protection in applications where the auto-reseting of this device may cause injuries to people or damage to equipment. Motors fitted with Manual Thermal Protectors require manual reset after they trip. If the Automatic Thermal Protector or the Manual Thermal Protector trip, disconnect the motor from

the power supply and investigate the cause of the thermal protector tripping. Wmagnet motors must be driven by WEG variable frequency drives only.

For more information about the use of variable frequency drives, follow the instructions in the motor manual on the website www.weg.net and in the manual of the variable frequency drive.

4. OPERATION

During operation, do not touch the non-insulated energized parts and never touch or stay too close to rotating parts.

Ensure that the space heater is always OFF during the motor operation.

The rated performance values and the operating conditions are specified on the motor nameplate. The voltage and frequency variations of the power supply should never exceed the limits established in the applicable standards.
Occasional different behavior during the normal operation (actuation of thermal protections, noise level, vibration level, temperature and current increase) must always be assessed by qualified personnel. In case of doubt, turn off the motor immediately and contact the nearest WEG service center.
Do not use roller bearings for direct coupling. Motors fitted with roller bearings require radial load to ensure their proper operation.
For motors fitted with oil lubrication or oil mist systems, the cooling system must be ON even after the machine is OFF and until the machine is at complete standstill.
After complete standstill, the cooling and lubrication systems (if any exist) must be switched OFF and the space heaters must be switched ON.

5. MAINTENANCE

Before any service is performed, ensure that motor is at standstill, disconnected from the power supply and protected against accidental energization. Even when the motor is stopped, dangerous voltages may be present in space heater terminals.
If motors are fitted with capacitors, discharge them before any handling or service is performed.

Motor disassembly during the warranty period must be performed by a WEG authorized service center only.

For motors with permanent magnet rotor (lines WQuattro and Wmagnet), the motor assembly and disassembly require the use of proper devices due to the attracting or repelling forces that occur between metallic parts. This work must only be performed by a WEG Authorized service center specifically trained for such an operation. People with pacemakers cannot handle these motors. The permanent magnets can also cause disturbances or damages to other electric equipment and components during maintenance.

Regularly inspect the operation of the motor, according to its application, and ensure a free air flow. Inspect the seals, the fastening bolts, the bearings, the vibration and noise levels, the drain operation, etc.

6. ADDITIONAL INFORMATION

For further information about shipment, storage, handling, installation, operation and maintenance of electric motors, access the website www.weg.net.
For special applications and operating conditions (for example, smoke extraction motors, totally enclosed air over (TEAO), motors for high thrust applications, motors with brake) refer to the applicable manual on the website www.weg.net or contact WEG.
When contacting WEG, please, have the full description of the motor at hand, as well as the serial number and manufacturing date, indicated on the motor nameplate.

7. EC DECLARATION OF CONFORMITY

WEG Equipamentos Elétricos S/A
Av. Prefeito Waldemar Grubba, 3000
89256-900 - Jaraguá do Sul – SC – Brazil,

and its authorised representative established in the European Community,

WEGeuro – Industria Electrica SA
Rua Eng Frederico Ulrich, Apartado 6074
4476-908 – Maia – Porto – Portugal

hereby declare that the products:

WEG induction motors and components for using in these motors:

Three-phase
IEC frames 63 to 630
Nema frames 42, 48, 56 and 143 to 9610

Single-phase
IEC frames 63 to 132
Nema frames 42, 48, 56 and 143 to 215

when installed, maintained and used in applications for which they were designed, and in compliance with the relevant installation standards and manufacturer's instructions, comply with the requirements of the following European Directives and standards where applicable:

Directives:
Low Voltage Directive 2006/95/EC
Regulation (CE) Nº 640/2009
Directive 2009/125/EC
EMC Directive 2004/108/EC (induction motors are considered inherently benign in terms of electromagnetic compatibility)

Standards:

EN 60034-1/2-1/5/6/7/8/9/11/12/14/30 and 60204-1

From 29/12/2009 on low voltage electric motors are no longer considered under the scope of the current **Machinery Directive 2006/42/EC.**

CE marking in: **1996**

Milton Oscar Castella
Engineering Director

Jaraguá do Sul, May 30th, 2011

8. WARRANTY TERM

WEG Equipamentos Elétricos S/A, Motor Unit, offers warranty against defects in workmanship and materials for their products for a period of 18 months from the invoice issue date by factory or distributor / dealer, limited to 24 months from date of manufacture. Motors of the HGF Line are covered for a period of 12 months from the invoice issue date by the factory or distributor / dealer, limited to 18 months from the date of manufacture.
The paragraph above contains the legal warranty periods. If a warranty period is defined in a different way in the commercial, technical proposal of a particular sale, that will override the time limits set out above.
The periods above are independent of installation date and provided that the following requirements are met: proper transportation, handling and storage; correct installation in specified environmental conditions free of aggressive agents; operation within the capacity limits and observation of the Installation, Operation and Maintenance Manual; execution of regular preventive maintenance; execution of repairs and/or changes only by personnel with WEG's written authorization; in the occurrence of an anomaly, the product must be available to the supplier for the minimum period necessary to identify the cause of the anomaly and to repair it properly; the buyer must immediately notify WEG of any defects occurred and they must be later confirmed as manufacturing defects by WEG. The warranty does not include assembly and disassembly services at the buyer's premises, costs of product transportation, as well as travel, lodging and meals expenses for the technical assistance staff when requested by the customer. The warranty service will be provided exclusively at a WEG authorized Technical Assistance or at the plant.
Components, parts and materials whose useful life is usually less than 12 (twelve) months are not covered by the warranty.
Under no circumstance will warranty services extend the warranty period of the equipment. However, new warranty equivalent to the original one will be due only to the components repaired or replaced by WEG.
The present warranty is limited to the product supplied. WEG will not be liable for damages to people, third parties, other equipment and facilities, loss of profits or other incidental or consequential damages.

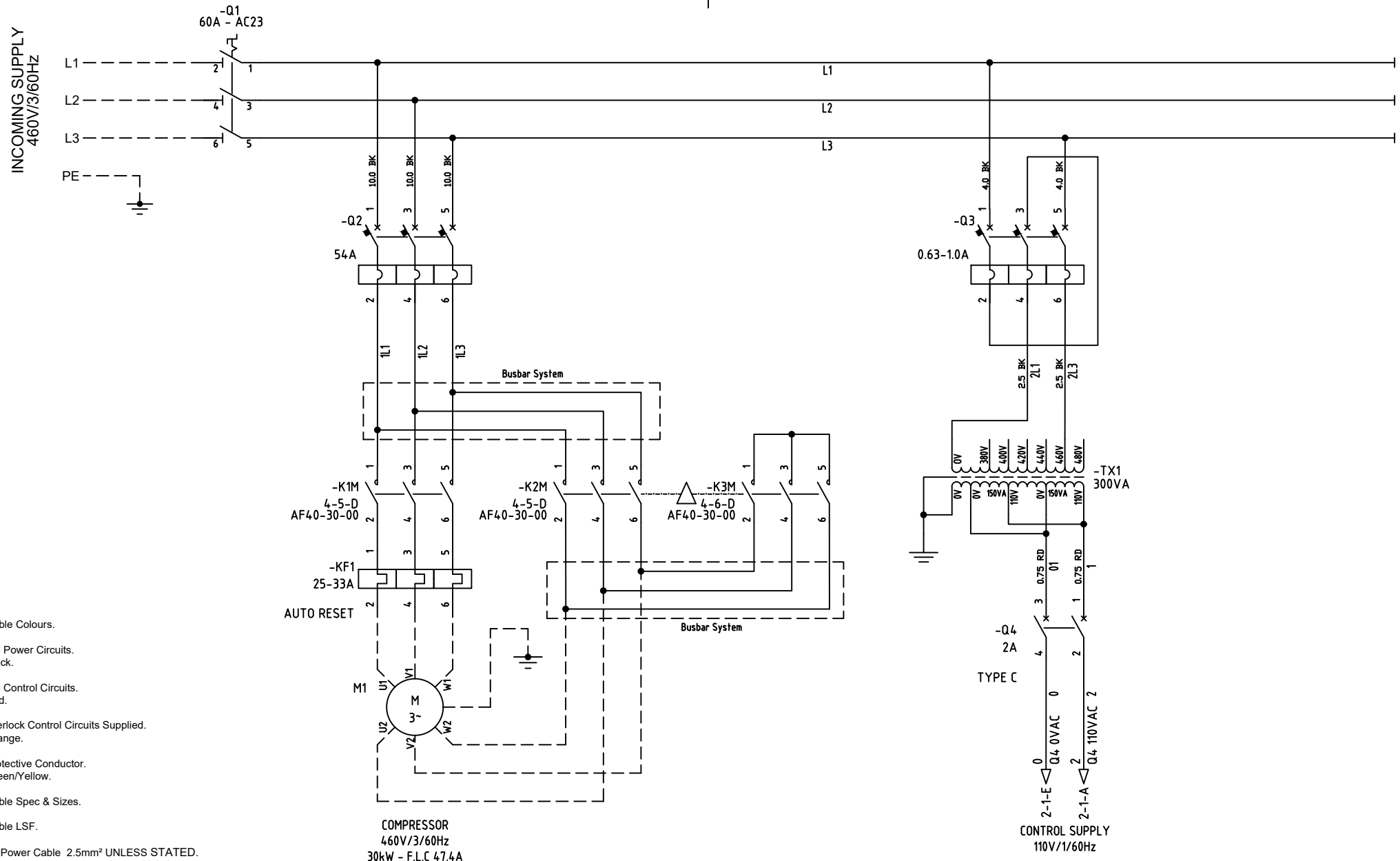
Gardner Denver

HIGH PRESSURE SOLUTIONS

Reavell

Section 5

Starter Control



Cable Colours.

AC Power Circuits.
Black.

AC Control Circuits.
Red.

Interlock Control Circuits Supplied.
Orange.

Protective Conductor.
Green/Yellow.

Cable Spec & Sizes.

Cable LSF.

All Power Cable 2.5mm² UNLESS STATED.
All Control Cable 0.75mm² UNLESS STATED.

Rev	Revision note	Date	Signature	Checked
B	As Built	27-08-19	BRL	DAP
A	First Issue	13/07/19	BRL	PNP

Customer:-
Gardner Denver Reavell

Order Number:-
10477039

Contract:-

Designed by	Approved by - date	Client Sign Off - date	Job No	Date	Scale
BRL	PNP - 15/07/19	Richard Taylor - 22/07/19	14670A	13/07/19	NTS

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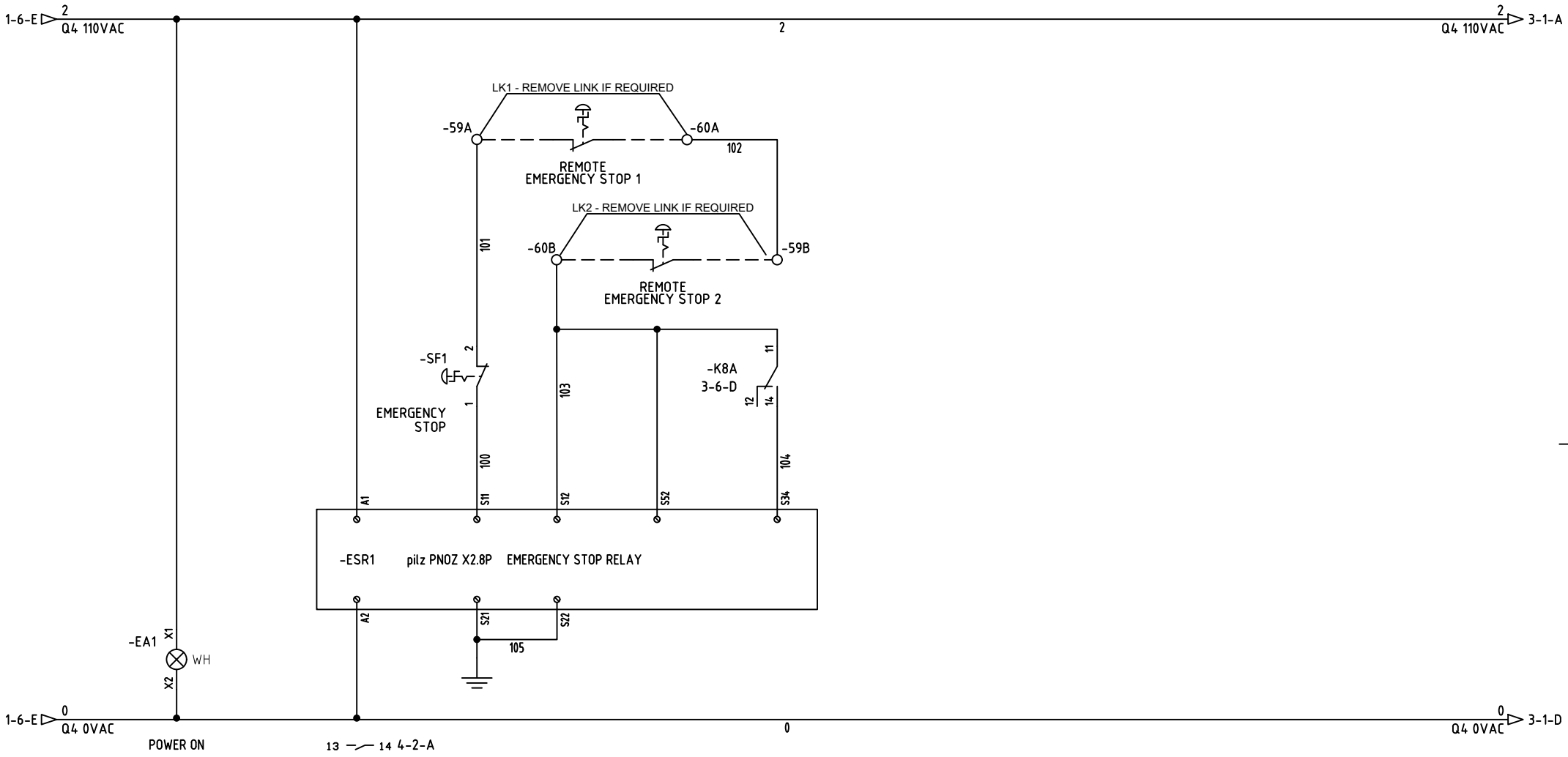
AUTOMATED POWER & DISTRIBUTION
ELECTRICAL MANUFACTURER & SUPPLIER
12A WILLIE SNAITH ROAD
NEWMARKET, SUFFOLK, CB8 7SU
TEL +44 (0) 1638 669399 FAX +44 (0) 1638 669926
www.apd.ltd.uk email sales@apd.ltd.uk

STAR/DELTA STARTER CONTROL PANEL
30kW - 460V/3/60Hz - 110V/1/60Hz

Y98520.2032	Revision B	Sheet 1of 6



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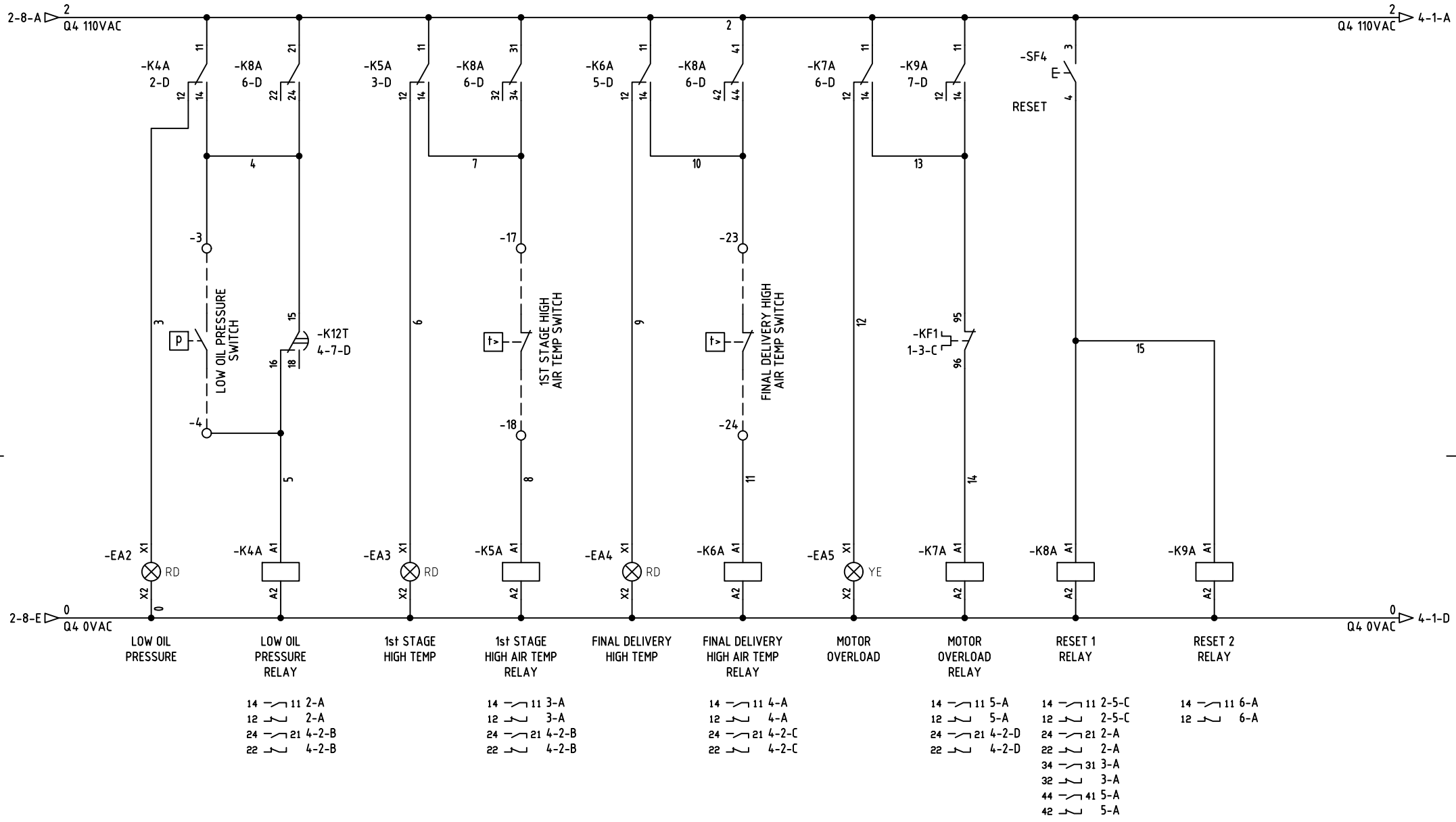
Revision	Sheet
B	2 of 6



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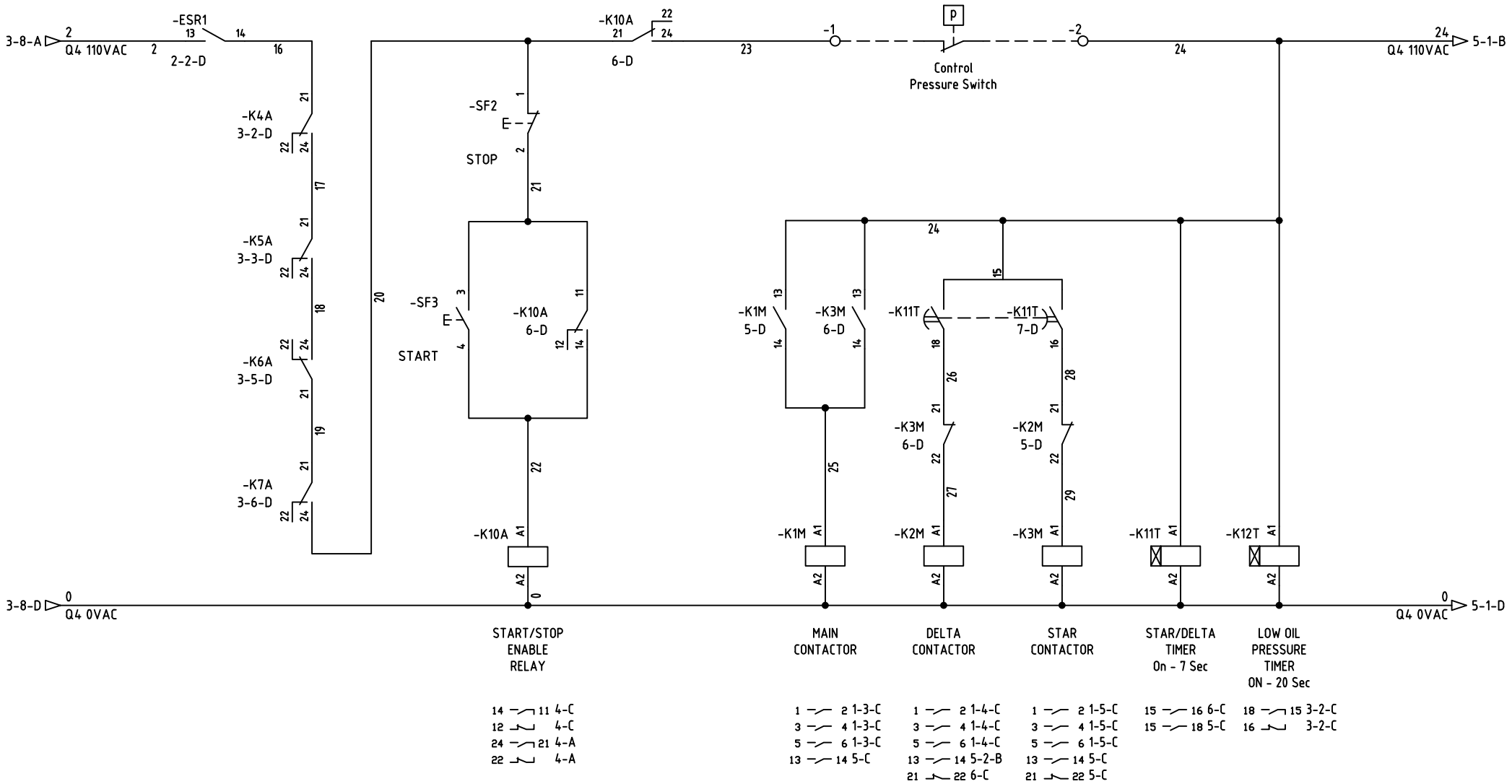
Revision B

Sheet 3 of 6



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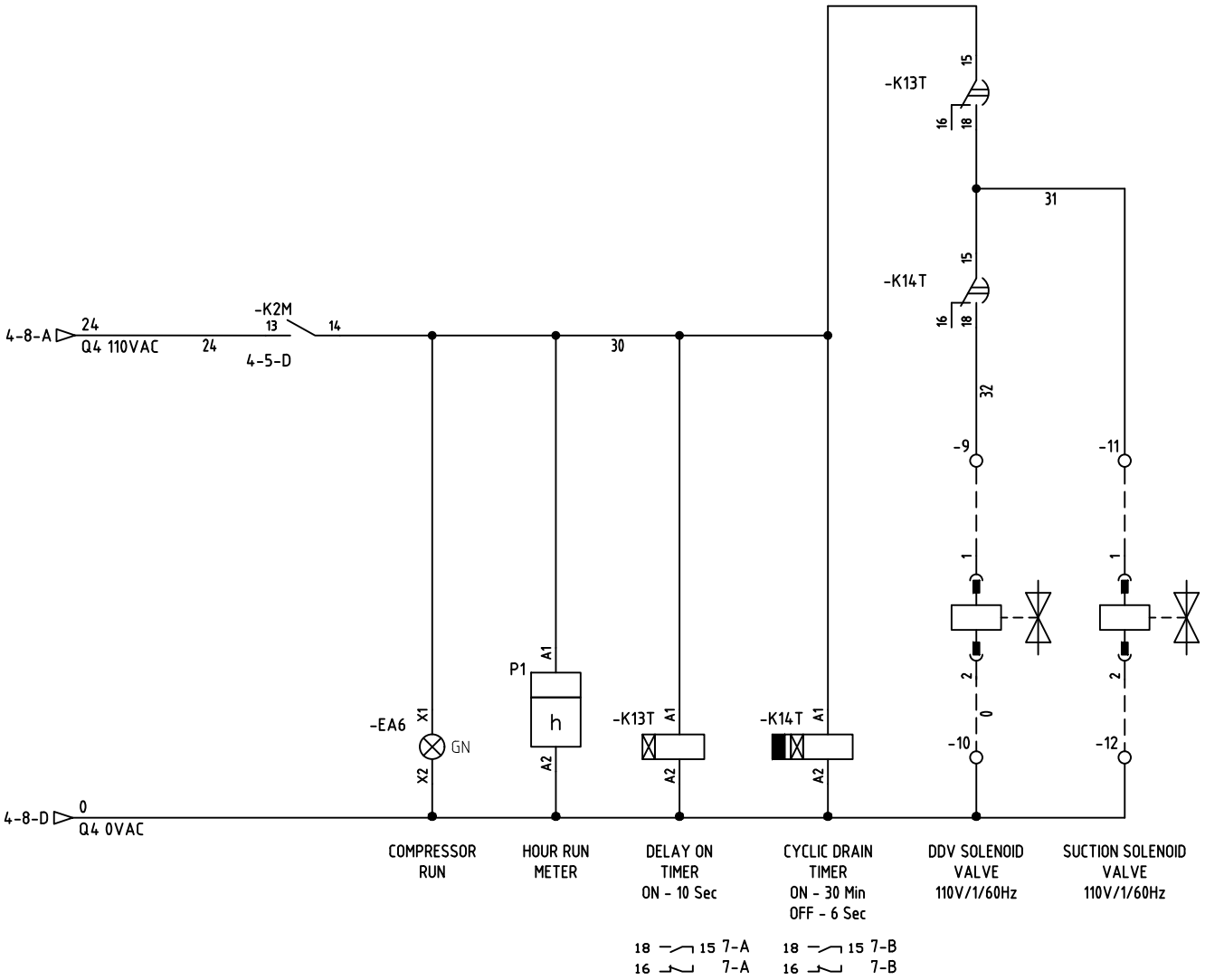
Y98520.2032

Revision B

Sheet 4 of 6



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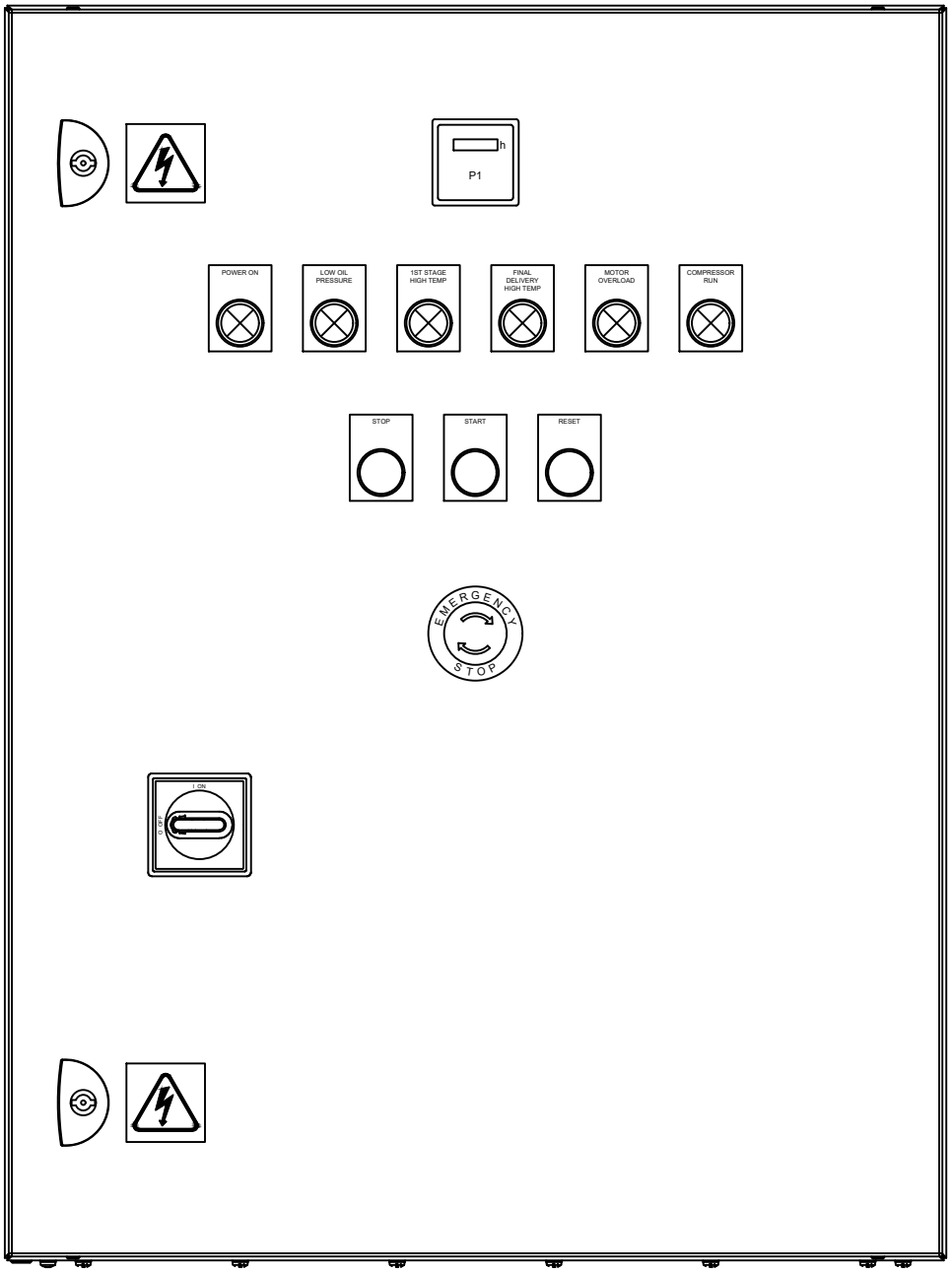
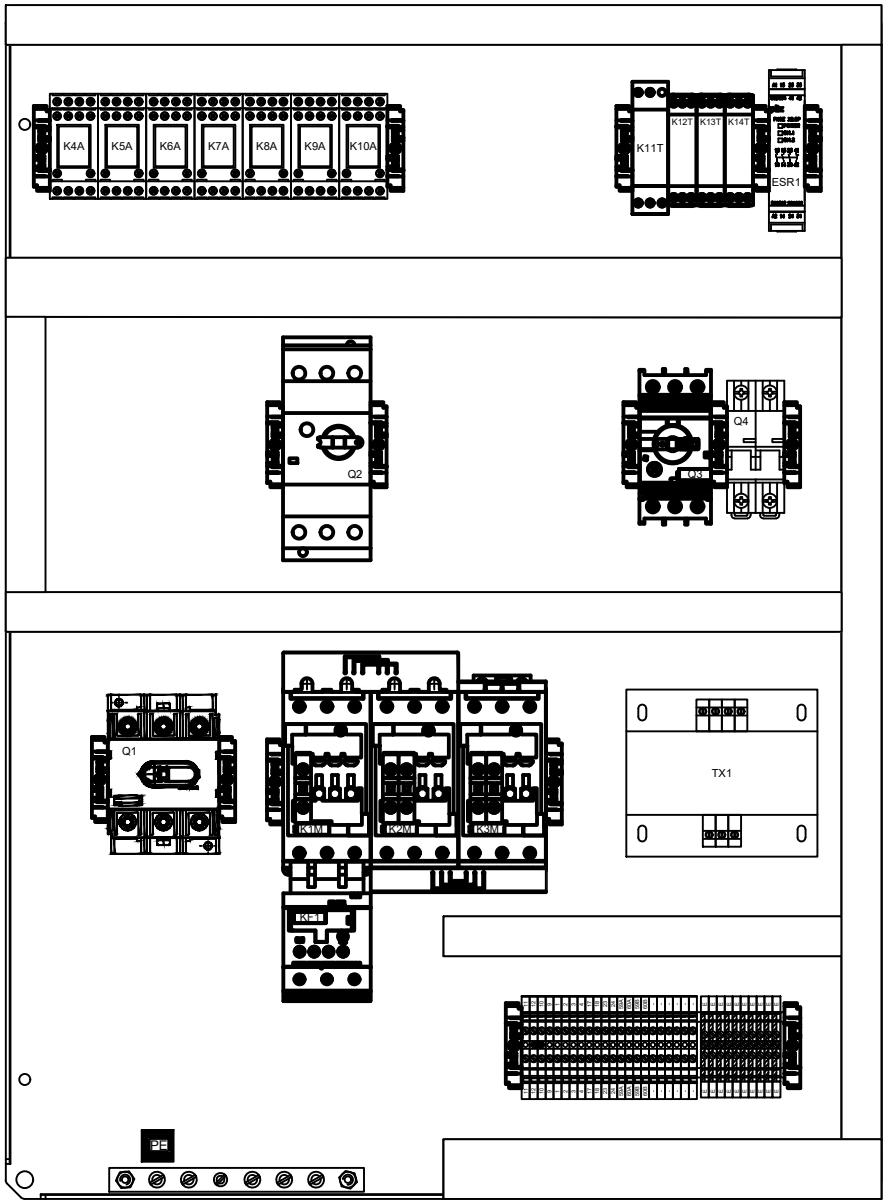
Y98520.2032

Revision B

Sheet 5 of 6



Enclosure ST6.825 - 600W x 800H x 250mmD



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30kW - 460V/3/60Hz - 110V/1/60Hz

Y98520.2032 | Revision B | Sheet 6 of 6

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HIGH PRESSURE SOLUTIONS

Reavell

Section 6

Equipment Data Sheets (APPs)

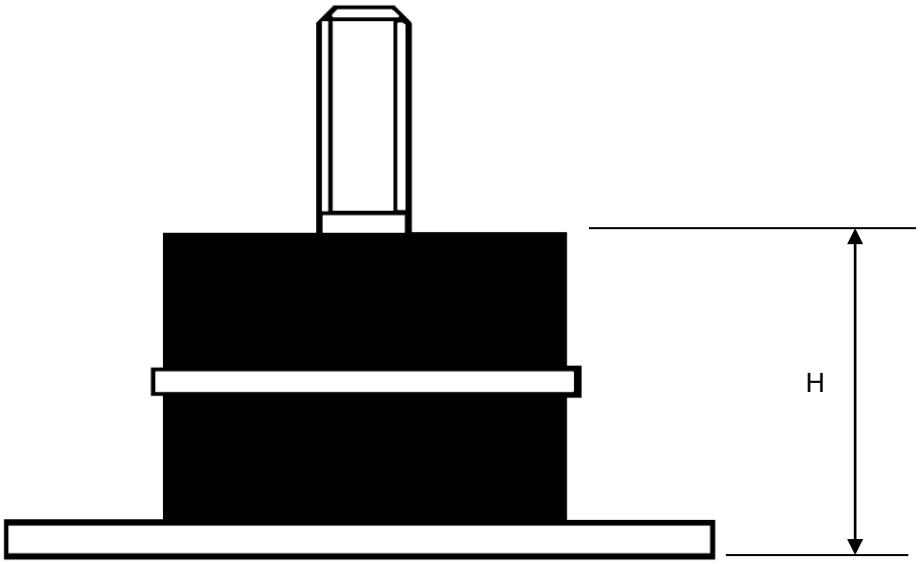
Component number	Object description	APP
98418.1015	AV MOUNT 2 YELLOW 1 WHITE SPOT	003
U334.L	DIAPHRAGM DRAIN VALVE	041
98650.1759	PRESSURE MAINTAINING VALVE 0-70 BAR	057
98524.1042	LOW OIL PRESS SWITCH Blue Dot	088
98288.1089	TEMP CONT 50-250 deg 1 mtr capillary	090
98288.1121	TEMP SWITCH (0 to 120 Deg.C) 1 mtr Capil	090
PS2197.4	SOLENOID VALVE (110V,60HZ)	138
98650.1754	SOLENOID VALVE 110V / 60 HZ 054001	139
98650.1011	SAFETY VALVE (T)-2.1 BAR	167
98650.1185-6.3	SAFETY VALVE	167
Y/98650.3045	P.S.V 19 Bar.G 1/2" IN, 3/4" OUT	167
98524.1269.10-30	STD WIKA PRESSURE SWITCH 10-30 BARG G1/4	457
U231.K	PNEUMATIC WATER VALVE (for 1")	704
98288.1026	PRESSURE GAUGE 0-10 BAR	850
98288.1027	PRESSURE GAUGE 0-70 BAR	850
98288.1028	PRESSURE GAUGE 0-6 BAR	850
98288.1133	PRESSURE GAUGE-0-40 BAR ST/STL. G1/4"	851
98288.1014	THERMOMETER -DIAL TYPE	855
98262.1009	OIL FILTER - EFL89	857
C5236.MK2	COMPR UNIT VMP36 MK2	Compressor
Y/98520.2032	S/C PANEL S/D 30KW 460/3/60 - 110V 5236	Control Panel
Y/98412.1821	MOTOR 30KW 460/3/60 IE3 4P B3L 200M	Motor

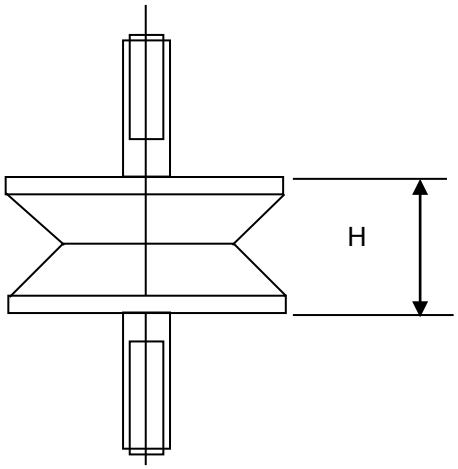
AVA TYPE

PART NUMBERS VARIOUS

PREVENTIVE MAINTENANCE

1) After installation and initial running in. Record height dimension (H) of each mount.
2) After a week or 100 hours running time recheck and record dimension (H)
3) Check this dimension every 3 to 6 months depending on usage i.e. regular usage every 3 months.
   Note: This dimension may only change a small amount during the life of the mount approximately 1mm.
4) Any oil or paint contact with the rubber mount will affect the life and performance, so keep to a minimum by regularly cleaning and clearing any contamination from the surrounding area.
5) Under normal working conditions the life expectancy will be 5 to 8 years.
6) Temperatures in excess of 70° C will have an adverse effect on the rubber and will shorten the life expectancy.





DRIVE RECOMMENDATIONS (V-BELT TRANSMISSION)

Details of drive arrangements and non isolation pad mountings are available from Reavell Works, Ipswich. An overload device must always be fitted to motors.

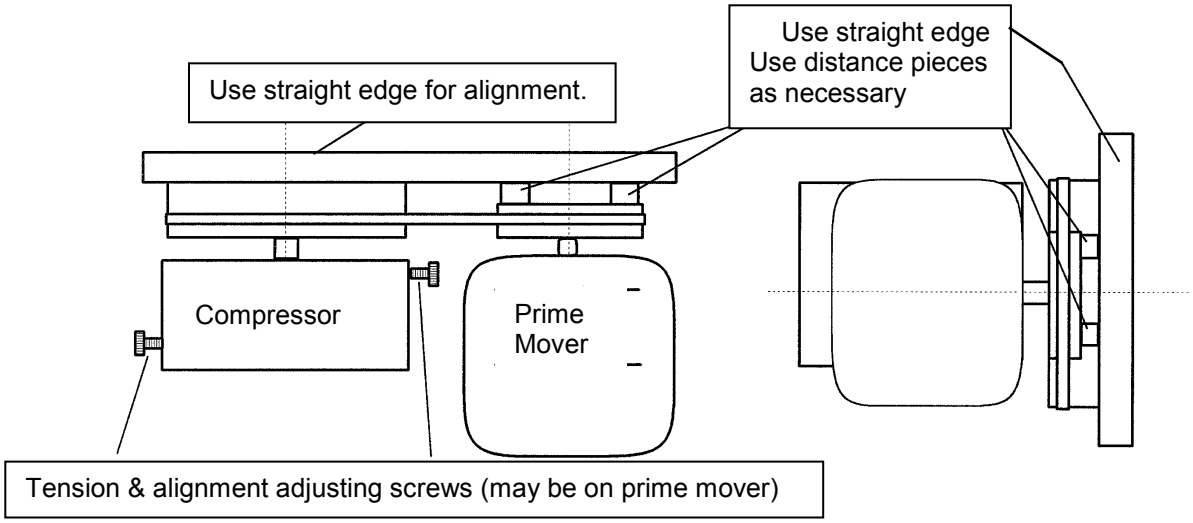
Manufacturer's terminal box wiring instructions must be observed.

It is recommended that for efficient maintenance scheduling an hours run meter be incorporated on the diesel engine or fitted to the motor starter.

Belt Drive:

It is very important that the driving and driven pulley grooves are in line and both pulley shafts parallel. V-belt tensioning procedures follow normal BS.3790, 1981 practice.

TYPICAL DRIVE ARRANGEMENT



Belt Drive Tensioning:

Recommended Practice for Installation Tension in Belt Drives:-

It is necessary to be able to measure the belt tensions with sufficient accuracy to avoid belt slip or overloaded bearings or to meet particularly arduous conditions.

Measure the length of the span in millimetres. At the centre of the span apply a force with a spring scale in a direction perpendicular to the span, until the belt is deflected from the normal by an amount equal to 0.015 mm for every millimetre of span length. For example, the deflection for a span of 1 metre would be 1000 mm x 0.015 mm or 15 mm.

In all cases it is essential that the pulley centres be fixed and that the larger pulley be then rotated at least four times before making the measurement. On a multiple belt drive it is essential that a matched set of belts be used and the above procedure be carried out on each belt.

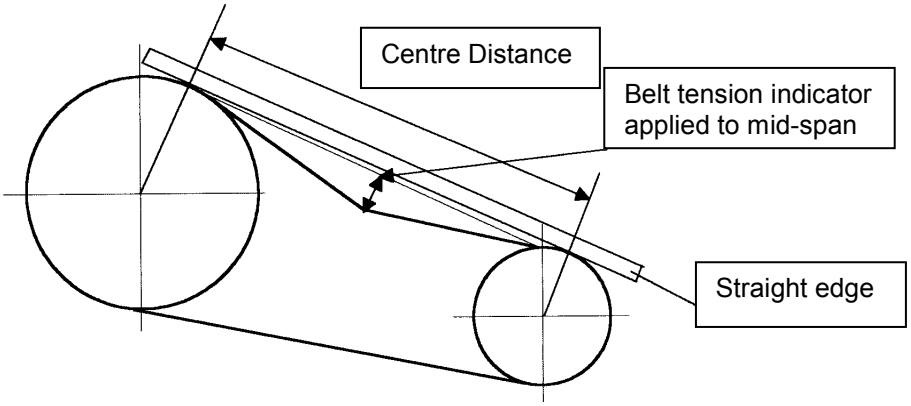
A measured value below the Basic force in the table indicates under tensioning, whilst a measured value above the Basic force indicates over tensioning. When starting up a drive with new belts, the drive should be tensioned to the New Belt force, before re-tensioning to the Basic force following a 15 – 20 minute run under load conditions to allow for the normal drop in tension during the running in period.

All belts should be watched carefully during the running in period after initial start-up. Re-tensioning and checking for wear should be carried out every 2000 hours using the above procedure for alignment and tensioning.

BELT DEFLECTION MEASUREMENT

Required Deflection Force "P" at Centre of Span For Compressor Speed Ranges (Newtons)
Above follows current BS3790 practice.

RECOMMENDED TENSIONING FORCE



ADJUSTMENT METHOD

If the belt tension is incorrect, correct it by using the adjusting screws provided, using a suitable straight edge (long enough to span both pulleys) or by use of the second belt, release motor holding down screws enough to allow the adjustment screws to be free to slide the motor on its adjustment slots without it being loose. Use method as described on later.

Note: - When using the adjusting screws it is important to maintain both the correct belt tension and pulley alignment. Having established the correct deflection and pulley alignment tighten compressor holding down screws, check deflection is correct. If not repeat the whole sequence again.
(M12 - 95 Newton Metres).(M10 - 55 Newton Metres)

Gardner Denver
HIGH PRESSURE SOLUTIONS

TABLE

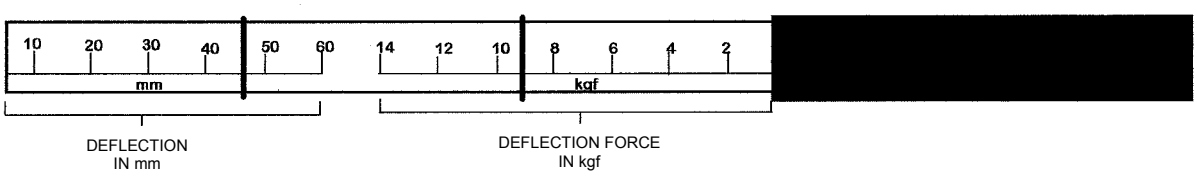
Belt Section	Force required to deflect belt 16 mm per metre of span				
		Basic setting force		New Belt setting force	
	Small Pulley Ø mm	Newton (N)	Kilogram force (kgf)	Newton (N)	Kilogram force (kgf)
SPZ	58 to 71	16	1.6	20	2.0
	75 to 90	18	1.8	22	2.2
XPZ & QXPZ	95 to 125	20	2.0	25	2.5
	Over 125	22	2.2	28	2.8
SPA HSPA	80 to 100	22	2.2	28	2.8
	106 to 140	30	3.0	38	3.9
XPA & QXPA	150 to 200	36	3.7	45	4.6
	Over 200	40	4.0	50	5.1
SPB HSPB	112 to 160	40	4.0	50	5.1
	170 to 224	50	5.1	62	6.3
XPB & QXPB	236 to 355	62	6.3	77	7.9
	Over 355	65	6.6	81	8.3
SPC	224 to 250	70	7.1	87	8.9
	265 to 355	92	9.4	115	12.0
	Over 375	115	12.0	144	15.0
8V	335 & above	150	15.0	190	19.0
Z	56 to 100	5 to 7.5	0.5 to 0.8		
A (& HA banded)	80 to 140	10 to 15	1.0 to 1.5		
B	125 to 200	20 to 30	2.0 to 3.1		
C	200 to 400	40 to 60	4.1 to 6.1		
D	355 to 600	70 to 105	7.1 to 10.7		

Method of Belt Tensioning Using a Belt Tension Indicator.

1. Calculate the deflection distance in mm, on a basis of 16 mm per metre of span.
   Centre distance (m) X 16 = Deflection (mm). If distance & deflection is known, go to .2.
2. Set the lower marker ring at the deflection distance required in mm on the lower scale.
3. Set the upper marker ring against the bottom edge of the top tube.
4. Place the belt tension indicator on top of the belt at the centre of span. And apply a force at right angles to the belt deflecting it to the point where the lower marker ring is level with the adjacent belt, on single belt drives place a straight edge across the two pulleys to act as a datum.
5. Read off the force value indicated by the top edge of the upper marker ring.
6. Compare this force to kgf value shown in the table above.
7. Tighten or loosen belt tensioning screws to achieve the correct value.
8. If the measured force falls within the values given, the drive should be satisfactory.

Note:- If a belt tension indicator is not available, a suitably scaled spring balance and rule will suffice.

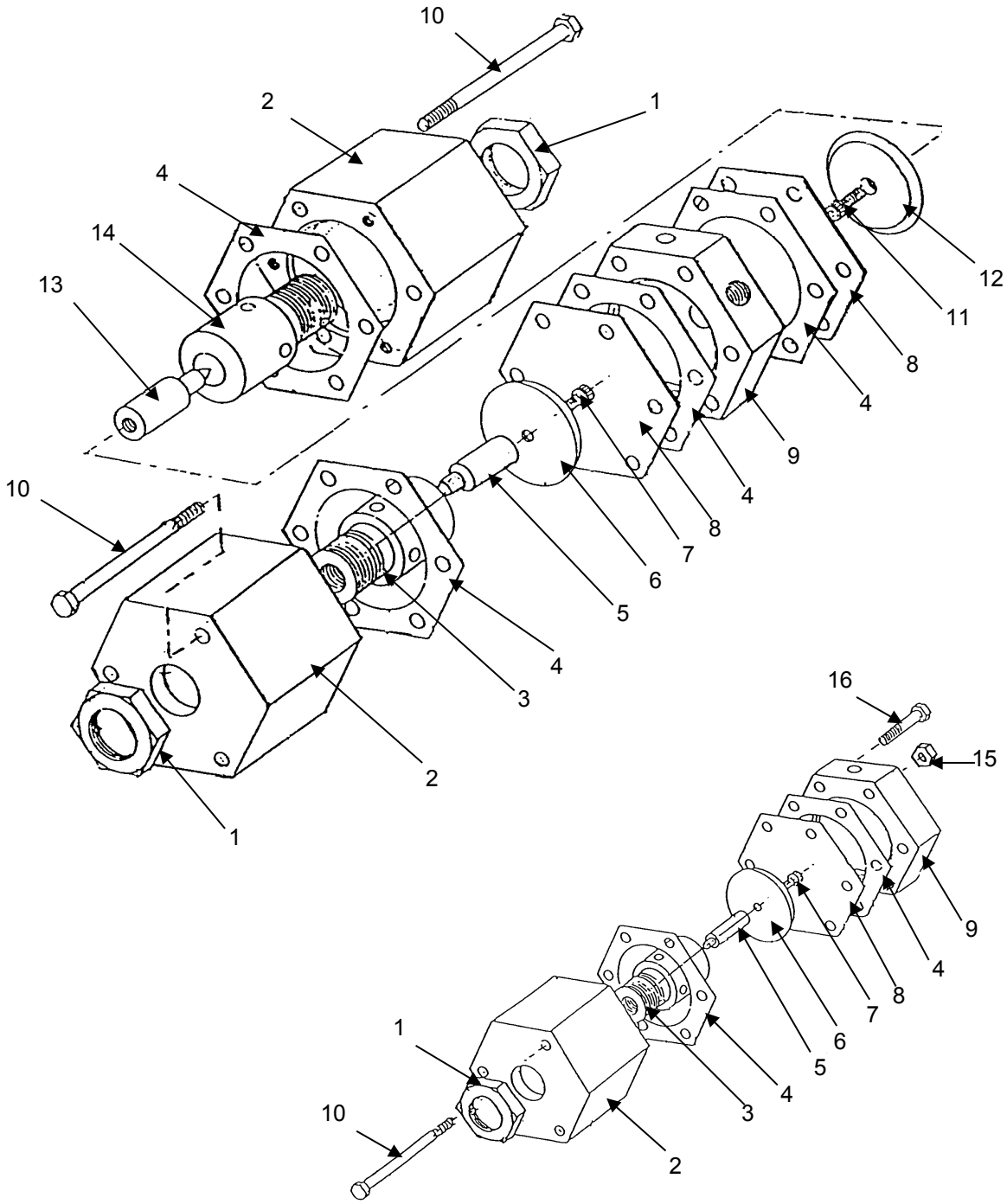
BELT TENSION INDICATOR



DIAPHRAGM DRAIN VALVES

ASSEMBLY INSTRUCTIONS

1) Assemble drain valve seat(s) (3 - 14) to valve body(s) (2) using silicon sealant on joint faces, tighten lock nut (1).
2) Assemble diaphragm (8) and joints (4) to cover (9) and body(s) (2).
3) Assemble complete assembly tighten setscrews (10) nuts (15) finger tight.
4) Tighten setscrews (10) nuts (15) evenly to the correct torque setting of 27Nm.



PARTS LIST FOR STANDARD SINGLE AND DOUBLE UNITS - U334 J to M

Item No	Part No	Description	J	K	L	M
1	PS 1290.4	LOCK NUT	2	1	2	2
2 & 9	C 203190.1	DOUBLE DRAIN VALVE BODY ASSEMBLY	1	0	1	1
2 & 9	C 203190.2	SINGLE DRAIN VALVE BODY ASSEMBLY	0	1	0	0
3	C 201159	VALVE SEAT (HP)	2	1	0	0
3	C 201417	VALVE SEAT (HP)	0	0	1	1
4	C 200722	DIAPHRAGM JOINT	4	2	4	4
5,6 & 7	C 201981	VALVE/VALVE PLATE ASSEMBLY (HP)	2	1	1	1
8	98210.1002	DIAPHRAGM	2	1	2	2
10	95006.133	HEX BOLT M6 X 75 LG	6	3	6	6
11,12 &13	C 201980	VALVE/VALVE PLATE ASSEMBLY (LP)	0	0	1	1
14	C 200842	VALVE SEAT (LP)	0	0	1	1
15	95111.4	NUT M6	0	3	0	0
16	95000.229	SETSCREW M6 X 20 L.G	0	3	0	0

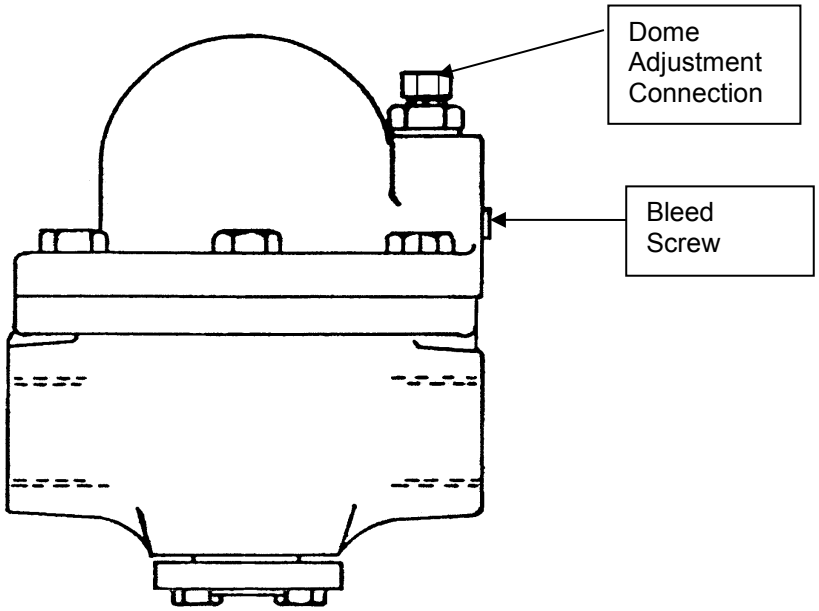
SPARE PARTS LIST

Item No	Part No	Description	J	K	L	M
4 & 8	98650.1535	DIAPHRAGM REPLACEMENT KIT	2	1	2	2
11,12,13&14	98650.1531	VALVE REPLACEMENT KIT (LP)	0	0	1	1
3,5,6 &7	98650.1532	VALVE REPLACEMENT KIT (HP)	2	1	1	1

PRESSURE MAINTAINING VALVE
(BACK PRESSURE REGULATING VALVE)
98650.1759

Maximum Pressure	40 bar
Temperature Range	- 10 to 100°C
Flow Rate	300m³/hr
Connections	1" BSPP

This valve is fitted to maintain a back pressure through the separators, filters and the dryers (if fitted). This ensures that these items of equipment reach their optimum working pressure as soon as possible, to give long filter life, good oil separation and low oil consumption.



SETTING & ADJUSTMENT.

1. Ensure all pipes and connections are clean
2. Using a remote pressure supply. i.e. suitable for desired working pressure.
3. Connect suitable air pipe to Dome adjustment connector.
4. Undo bleed screw.
5. Allow air into dome until desired pressure is obtained.
6. Close bleed screw.
7. Start compressor, bring up to desired working pressure.
8. If the required maintained pressure is correct, disconnect remote pressure from dome.
9. If not satisfactory, adjust remote pressure and repeat steps 3, 4 & 5 until the desired level is obtained.
10. Disconnect remote pressure supply.
11. Plug dome connection with a plastic cap.

MAINTENANCE.

The only maintenance required, other than routinely checking for leaks, is to replace all elastomers and plastic parts at two yearly intervals

Gardner Denver
HIGH PRESSURE SOLUTIONS

LOW OIL PRESSURE SWITCH

PART NO: 98524.1042, .1122, .1140, .1169, .1170 & .1176

OPERATION

Located in the crankcase on water-cooled & large air-cooled compressors, in the oil filter body on air-cooled, the pressure switch stops the compressor when the oil pressure drops to pre-set pressure setting.

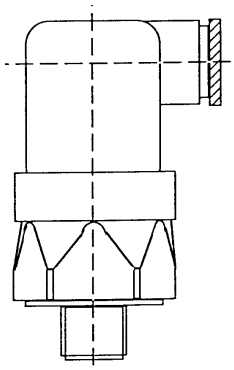
Part No.	Compressor Type	Inlet Pressure	Setting
98524.1042	WATERCOOLED	Standard	1 bar (15 psi) falling
98524.1042	AIRCOOLED – GAZPACKS	over 0.1 bar	1 bar (15 psi) falling
98524.1042	AIRCOOLED – 5450/5470	Standard	1 bar (15 psi) falling
98524.1122	AIRCOOLED	Standard	0.5 bar (7.5 psi) falling
98524.1122	AIRCOOLED – GAZPACKS	up to 0.1 bar	0.5 bar (7.5 psi) falling
98524.1140	AIRCOOLED – GAS	Standard	1 bar (15 psi) falling
98524.1169	AIRCOOLED – IZAR	up to 0.1 bar	0.5 bar (7.5 psi) falling
98524.1170	WATERCOOLED – GAS	24 VDC Gold Contacts	1 bar (15 psi) falling
98524.1176	WATERCOOLED – GAS	24VDC Gold Contacts	2 bar (29 psi) falling

The switch transforms a change of pressure into an electrical "On" or "Off" signal.

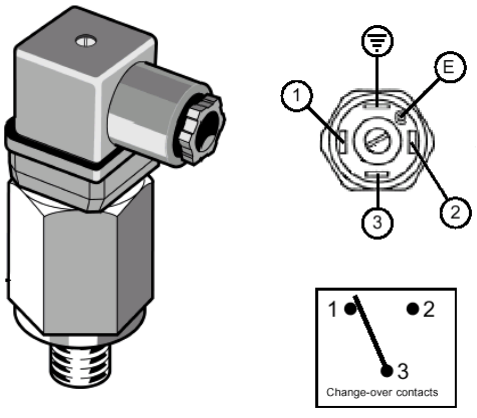
When a pre-set pressure is reached the snap action contact stops the compressor.

INSTALLATION

Either of two makes of low oil pressure switch may be fitted as shown below. Terminal connections are shown for clarity.



Connect Common (1) and Normally Open (4) terminals to compressor control panel



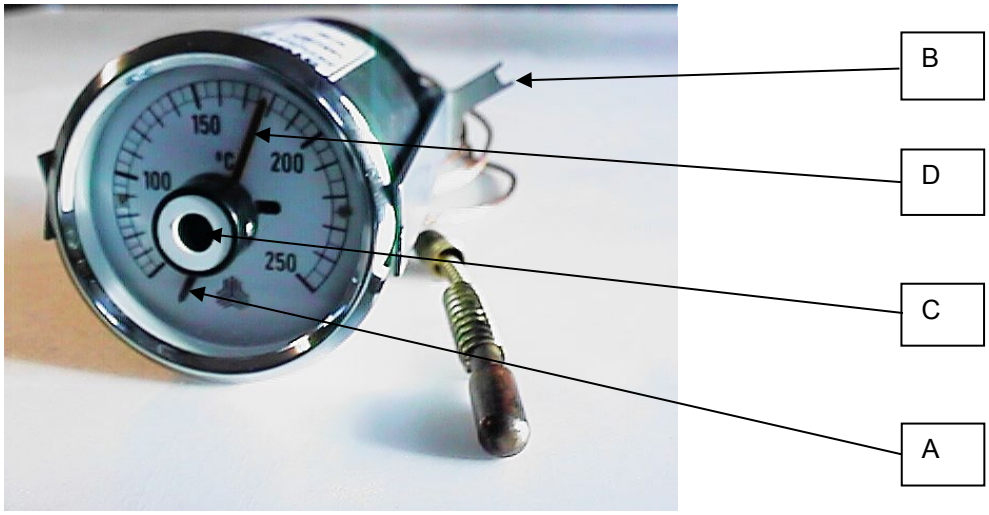
Connect Common (3) and Normally Open (2) terminals to compressor control panel

Gardner Denver
HIGH PRESSURE SOLUTIONS

THERMOMETER SWITCHES

These thermometer switches are set to the figures quoted below, the following information is for setting information only, if the temperature switch has to be replaced or re-adjusted.

If the switch needs to be re-adjusted due to a higher ambient temperature or any reasons please contact Gardner Denver ltd for more information.



- **TO SET TRIP INDICATOR POINTER**

1. Run compressor to establish normal running temperature of black pointer [A].
2. When reading is stable, remove adjusting key [B] from rear of switch and insert into front of central knob adjuster [C].
3. Rotate key to adjust red pointer [D] to 10°c above running temperature pointer [A].
4. Adjustment of trip pointer must be within range that has been pre-set at Gardner Denver ltd before despatch, but may be adjusted within this range depending on ambient conditions.

Note: do not reset temperature controller setting if it trips, always locate and correct possible fault before any attempt is made to alter setting.
Contact Gardner Denver ltd engineering department for more information if the compressor trips when switch is set at maximum value.

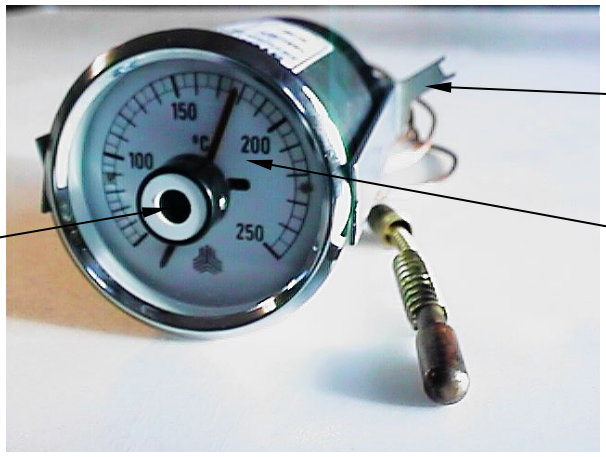
CONTROLLER PART No	TRIP POINTER STOP SETTING °C	USED ON COMPRESSOR MODEL
C202556.1	125	5236.1
C202556.2	140	5212
C202556.3	150	5336,5415
C202556.4	155	5215 & 5217
C202556.5	170	5236.2,5315
C202556.6	180	5415E5317,5417.5417N
C202556.7	205	5436(CU TUBES)
C202556.8	220	5436.1 &.2,5436H,5436N,5436SN & 5437
C202749.1	200	5280
C202749.2	210	5280
C202749.3	175	5409
C202960.1	75	WATERCOOLED M/C'S DELIVERY
C202960.2	60	5211

CONTROLLER PART No	TRIP POINTER STOP SETTING °C	USED ON COMPRESSOR MODEL
C202960.3	55	WATER OUTLET
C202960.4	80	5207,5209,5213
C202960.5	50	5417N,5436N
C202964.1	75	5280,5281,5282,5283, DELY
C202964.2	60	5450,5470 DELY
CONTROLLER PART No	**TEMPERATURE RANGE °C**	**USED ON COMPRESSOR MODEL**
98288.1089	50 – 250 **°C**,1M	WATER-COOLED 5000 SERIES
98288.1121	0 - 120**°C**, 1M	WATER-COOLED 5000 SERIES
98288.1222	50 - 250**°C**, 5.5M	WATER-COOLED 5000 SERIES
98288.1315	50 - 250**°C**, 5.5M (Russian)	WATER-COOLED 5000 SERIES
98288.1223	0 - 120**°C**, 5.5M	WATER-COOLED 5000 SERIES
98288.1314	50 - 250**°C**, 5.5M (Russian)	WATER-COOLED 5000 SERIES
98288.1298	50-250**°C**,8.5M	WATER-COOLED 5000 SERIES
CONTROLLER PART No	**WHERE FITTED**	**USED ON COMPRESSOR MODEL**
98288.1093	1st – 5th STG. DELIVERY	5450 & 5470
98288.1094	FINAL DELIVERY	5450 & 5470

- **TO SET TRIP INDICATOR POINTER – FOR PART 98288.1215**

The purpose of this switch is to prevent the compressor from starting in lower than recommended ambient temperatures.it is fitted at the compressor gas inlet port. The minimum temperature of -10°c has been set at the factory, but this can be raised on site if required by following the procedure below.
To set.
Release adjusting key (A) from back of instrument by removing securing nut.
Insert end of key into central adjuster knob (B) and turn to adjust set pointer to required minimum temperature **above -10°c.**
Replace adjusting key and secure with nut.

CONTROLLER PART No	TEMPERATURE RANGE	TRIP POINTER STOP SETTING °C	USED ON COMPRESSOR MODEL
98288.1215	-40° / +80°C	-10°C FALLING	5000 SERIES WATER-COOLED
98288.1216	-40° / +80°C	-10°C FALLING	5000 SERIES WATER-COOLED



3 WAY SOLENOID VALVE

PS2197

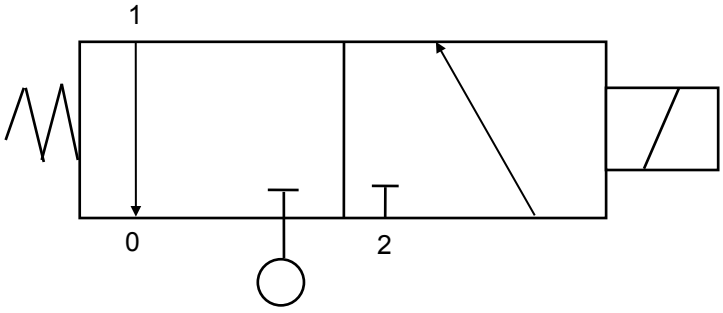
OPERATION

3 way normally closed energise to open, continuous duty.
On starting the solenoid valve opens (energised) this operates the diaphragms which in turn closes the valves within the D.D.Vs. (Diaphragm Drain Valves) thus allowing pressure to build up in the system to the desired pressure. On shutdown the solenoid valve closes (de-energised) this takes the pressure of diaphragms thus allowing the drains to blow any condensate collected within the stage separators.

INSTALLATION

Technical Details			Current consumption	
Part No	Voltage	Hz	Current Inrush	Hold
PS2197.1	230	50 AC	26 VA	16 VA
PS2197.2	110	50 AC	26 VA	16 VA
PS2197.3	220	60 AC	26 VA	16 VA
PS2197.4	110	60 AC	26 VA	16 VA
PS2197.5	24	DC	-	10 watts
PS2197.6	110	DC	-	10 watts
PS2197.7	230	DC	-	10 watts
PS2197.8	24	50 AC	26 VA	16 VA
PS2197.9	12	DC	-	10 watts
PS2197.10	24	60 AC	26 VA	16 VA
PS2197.11	125	DC		10 watts
PS2197.12	48	50AC	26VA	16VA
98516.5121	440	60	26VA	16VA

Electrical connection Amps pin to DIN 46242
Connector To DIN 43650
Protection IP65
Cable thread size PG9
Coil Class 'H' 180°C insulation
Coil duty Continuous
Voltage tolerance from normal -10% to +10%
Port Size G 1/8"
Orifice Size Ø1.6mm
Maximum working pressure 12 bar g.
Working fluid Air, water, gas, fuel oil & non corrosive liquids.
Ambient temperature range -15°C to +50°C



3 WAY SOLENOID VALVE

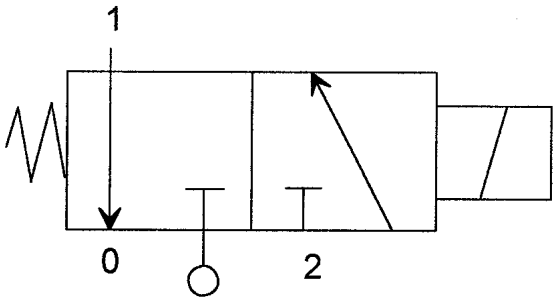
OPERATION

3 way normally open energise to close, continuous duty.
On starting the solenoid valve closes (energised) this stops the air from the receiver to the hand/automatic 1st stage valve unloaders which in turn allows the compressor to come on to load, at the same time another solenoid valve (PS2197) opens to close the diaphragm Drain Valves
On shutdown the solenoid valve opens allowing air onto the 1st stage valve unloaders which unloads the compressor at the same time the other solenoid valve (PS2197) closes to unload and discharge all condensate through the Diaphragm Drain Valves. See APP 138 for details.

INSTALLATION

Technical Details			Current consumption	
Part No	Voltage	Hz	Inrush	Hold
98650.1658	240	50 AC	26 VA	16 VA
98650.1662	110	50 AC	26 VA	16 VA
98650.1754	110	60 AC	26 VA	16 VA
98650.1755	240	60 AC	26 VA	16 VA
98650.2020	24	50 AC	26 VA	16 VA
98650.2021	24	DC		
98650.2022	24	60 AC	26 VA	16 VA

Electrical connection	Amps pin to DIN 46242
Connector	To DIN 43650
Protection	IP65
Cable thread size	PG9
Coil	Class 'H' 180°C insulation
Coil duty	Continuous
Voltage tolerance from normal	-10% to +10%
Port Size	G 1/8"
Orifice Size	Ø 0.8mm
Working pressure	40 bar g.
Working fluid	Air, water, gas, fuel oil & non-corrosive liquids.
Ambient temperature range	-15°C to +50°C



INSTALLATION AND OPERATING INSTRUCTIONS
SAFETY VALVES

INTRODUCTION

Due consideration should be taken of climatic. Process or other conditions which might adversely affect the performance of the safety valve. Installation must be undertaken by qualified technicians and to good engineering practice. In addition, user's attention is drawn to our joint responsibility to ensure that the Health and Safety at Work Act is not contravened by incorrect installation. Commissioning or servicing. It is important that the valve to be installed is correct in every aspect, i.e. set pressure, size, material and type etc. for the application.

STORAGE OF VALVE BEFORE INSTALLATION

Valves should be stored preferably between-5°C and +25°C and a relative humidity of less that 75%. Very moist or dry conditions should be avoided. If a safety valve is installed after six months, or more, of storage, it must be subjected to functional test before commissioning. Thread protectors should not be removed until immediately, prior to testing or installation, as they also prevent the ingress of foreign matter, which could harm the valve.

INSTALLATION

VALVE INLET: Under no circumstances should it be possible to isolate the safety valve from the protected system. Safety valves should be mounted as close as possible to the protected system. The connecting pipe should be straight and as short as possible. The inlet line to the safety valve should have an effective area of flow, at least equal to that of the safety valve inlet. Gardner Denver Limited should be consulted if the safety valve is to be mounted in any position other than vertically. The maximum pressure drop through the inlet line to the safety valve should not exceed 3% of the set pressure when the valve is discharging at its rated capacity.

VALVE OUTLET: No isolating devices shall be fitted to the outlet pipe. Discharge pipes should be as short as possible and of such a size that the pressure developed therein not reduce the relieving capacity. Ensure arrows indicating the direction of the flow are pointing in the correct direction. The cross-sectional area of the discharge pipe should not be less than the area of the safety valve outlet. Where safety valves are discharged into a manifold, the manifold must be capable of accommodating simultaneous discharge of all valves connected to the manifold. Atmospheric discharge or discharge pipes should terminate at a location which will not cause a hazard to personnel, particular attention being given to hazardous fluids or particles.

GENERAL: Inlet and outlet piping should be capable of supporting the safety, valve so that no unacceptable mechanical load or vibration is transmitted to the valve, and be sufficiently strong to withstand 'the effects of the reaction forces when the valve is discharging. All pipework or pressure vessels to which the safety valve is connected should be thoroughly cleaned before fitting the safety valve, to ensure that foreign matter does not pass through the valve. Particular care should be taken with the use of scaling compounds and P.T.F.E. tape to ensure that they do not enter the valve.

Atmospheric discharge valves should not be painted or coated with any substance, which could possibly obstruct or restrict free and full discharge through the valve. Suitable protection should be provided to prevent environmental build up or ingress of foreign matter. Any condition that could lead to blockage of discharge piping or discharge ports on safety valves must be avoided. Where appropriate, discharge pipes should be provided to a non-hazardous location. Where there is a possibility of a liquid head forming in a discharge pipe, a drain should be provided which leads to a safe discharge location. To prevent unnecessary lifting of the safety valve it is recommended that there is a margin of at least 10% between the maximum operating pressure and the set pressure of the safety valve.

FUNCTIONAL TESTING
Once installed in service. Valves should be tested at least once every six months to ensure free movement of parts. This should be carried out by operating the easing gear when the valve is under a pressure of not less than 75'% of the set pressure. Where valves are supplied without easing gear, the test should be in accordance with the full functional test described overleaf. Due regard must be paid to the safety personnel. Testing should not create a hazard, particular attention being given to foreign matter located in discharge outlets.

CONFIGURATION
The valves have a base number for different type valve arrangement from this information the valve set pressure can be obtained, examples:-

98650.2073 is the base unit number.

98650.2073-16.2 -16.2 being to the setting in bar g - wire locked.

98650.2073-96.25 -96.25 being to the setting in bar g - wire locked.

98650.1164 is the base unit number.

98650.1164-28 -28 being to the setting in bar g - wire locked.

98650.1163 is the base unit number.

98650.1163-7.6 -7.6 being to the setting in bar g - wire locked.

98650.1020 is the base unit number.

98650.1020-3.8T -3.8 being to the setting in bar g - wire locked and tagged.

98650.1021 is the base unit number.

98650.1021-9.6 -9.6 being to the setting in bar g - wire locked.

98650.1022 is the base unit number.

98650.1022-90T -90 being to the setting in bar g - wire locked and tagged.

Note the valves cannot be interchanged as the range of setting is limited

Notes on equipment protection per EN/IEC 60529 and NEMA For Bourdon tube or diaphragm pressure gauges

General information

This technical information describes the measures to prevent both the formation of condensation within a hermetically sealed case, and also the intrusion of water into cases vented to the atmosphere. It applies for both Bourdon tube pressure gauges and diaphragm pressure gauges.

1. Introduction and explanation of physical conditions

The formation of condensation in the cases of hermetically sealed, unfilled instruments cannot generally be avoided. This is based on the physical fact that the humidity found in air, under particular conditions, settles on cold surfaces as condensation. The warmer the air, the more humidity it can hold. If the air cools (e.g. at the window of a gauge), then the air can only hold a small amount of humidity. The excess humidity settles as condensation on the window.

In addition, water in the form of splash, jet and rain water from outside can intrude into the case, so long as the instrument is vented to atmosphere.

2. Explanation of the degrees of protection per EN/IEC 60529

Degrees of protection against solid foreign bodies, defined by the first index number

First index number	Degree of protection	
	Code designation	Definition
0	Not protected	–
1	Protected against solid foreign bodies of 50 mm diameter and larger	The object probe, a round body of 50 mm diameter, must not fully intrude [1)]
2	Protected against solid foreign bodies of 12.5 mm diameter and larger	The object probe, a round body of 12.5 mm diameter, must not fully intrude [1)]
3	Protected against solid foreign bodies of 2.5 mm diameter and larger	The object probe, 2.5 mm in diameter, must not intrude at all [1)]
4	Protected against solid foreign bodies of 1.0 mm diameter and larger	The object probe, 1.0 mm in diameter, must not intrude at all [1)]
5	Dust protected	Ingress of dust is not completely prevented, but dust may not intrude in a such a quantity that the satisfactory operation of the instrument or safety is impaired
6	Dust tight	No ingress of dust

1) The full diameter of the object probe must not pass through any opening in the case.

Illustration 1
Source: EN/IEC 60529

Degrees of protection against water, defined by the second index number

Second index number	Degree of protection	
	Code designation	Definition
0	Not protected	–
1	Protected against dripping water	Perpendicularly falling drops must have no damaging effects
2	Protected against dripping water when the case is inclined to 15°	Perpendicularly falling drops must have no damaging effects, when the case is inclined to an angle of up to 15°, either side of perpendicular
3	Protected against sprayed water	Water that is sprayed at an angle of up to 60°, either side of perpendicular, must have no damaging effects
4	Protected against splash water	Water that splashes against the case from any direction must have no damaging effects
5	Protected against water jets	Water that splashes against the case, as a jet, from any direction, must have no damaging effects
6	Protected against strong water jets	Water that splashes against the case, as a strong jet, from any direction, must have no damaging effects
7	Protected against the effects of temporary immersion in water	Water must not enter in any quantity which could cause damage, when the case, under standardised pressure and temperature conditions, is temporarily immersed in water
8	Protected against the effects of permanent immersion in water	Water must not enter in any quantity which could cause damage, when the case is permanently immersed in water, under conditions which must be agreed between the manufacturer and user. The conditions must, however, be more demanding than those for the index number 7

Illustration 2
Source: EN/IEC 60529

Example: Ingress protection IP65

- First index number 6: Dust tight, no ingress of dust
- Second index number 5: Protected against water jets: Water that splashes against the case as a jet from any direction must have no damaging effects.

3. Comparison of NEMA (National Electrical Manufacturers Association) and EN/IEC 60529

NEMA ingress protection Model number	EN/IEC 60529 ingress protection Classification
1	IP10
2	IP11
3	IP54
3 R	IP14
3 S	IP54
4 and 4 X	IP66
5	IP52
6 and 6 P	IP67
12 and 12 K	IP52
13	IP54

Illustration 3

4. Measures against the formation of condensation

Different filling liquids depending on the ambient temperature and the electrical conductivity

In order to avoid the formation of condensation in the case, WIKA recommends filling the instruments with glycerine. For contact gauges, the filling can be made with silicone oil, since silicone oil, unlike glycerine, is not hygroscopic and therefore prevents a short circuit within the instrument.

If the ambient temperature drops below -20 °C, then we recommend that the instrument absolutely must be filled with silicone oil. Even at temperatures down to -50 °C, silicone oil can still be used due to its low viscosity.
For flammable and/or explosive media, e.g. oxygen, inert filling liquids must be used.

5. Hermetically sealed instruments and effects associated with them

In order to prevent the intrusion of water into the case, it is recommended that an ingress protection method is chosen that reliably inhibits this (see illustrations 1 and 2). The ingress protection demands that the instrument is hermetically sealed.

With vented instruments, the vent valve has to be closed in order to achieve the specified ingress protection.
This, however, produces a temperature error, which can affect the measuring result (see illustrations 4, 5 and 6).
Therefore the vent valve has to be opened for a short time before reading the measured value.

5.1 Temperature errors for unfilled and filled Bourdon tube pressure gauges

A standard 232.50/30 instrument with a pressure range greater than 25 bar can be made hermetically sealed without any problems, and manufactured with an ingress protection of IP66. The temperature error that occurs with these instruments is negligible, since it is so small in relation to the pressure range, that the instrument still will operate within its specified class accuracy.
Instruments with a scale range of less than 25 bar can likewise be made hermetically sealed, though a temperature error will then be present (see illustration 4). The temperature errors present are shown in the following graphs.

Temperature errors in hermetically sealed, unfilled Bourdon tube pressure gauges

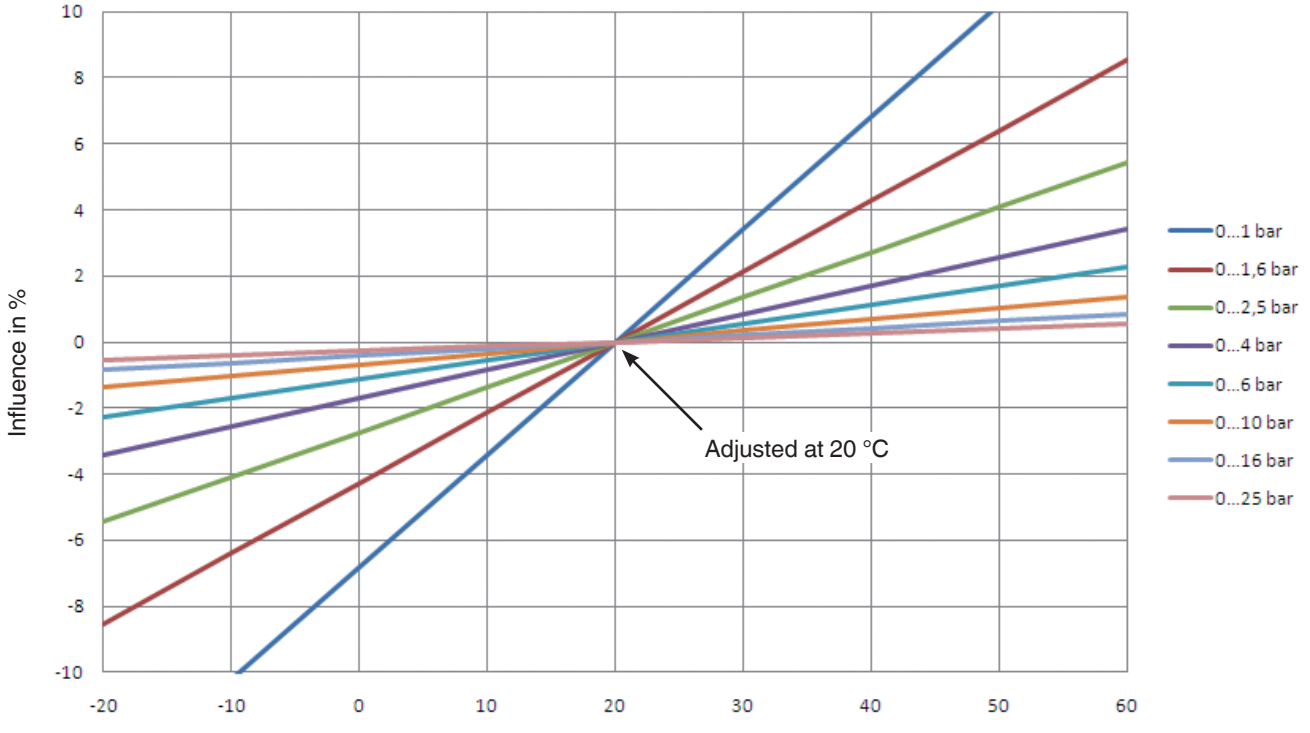


Illustration 4

Temperature errors in hermetically sealed, filled Bourdon tube pressure gauges

Filled to 90 % with glycerine

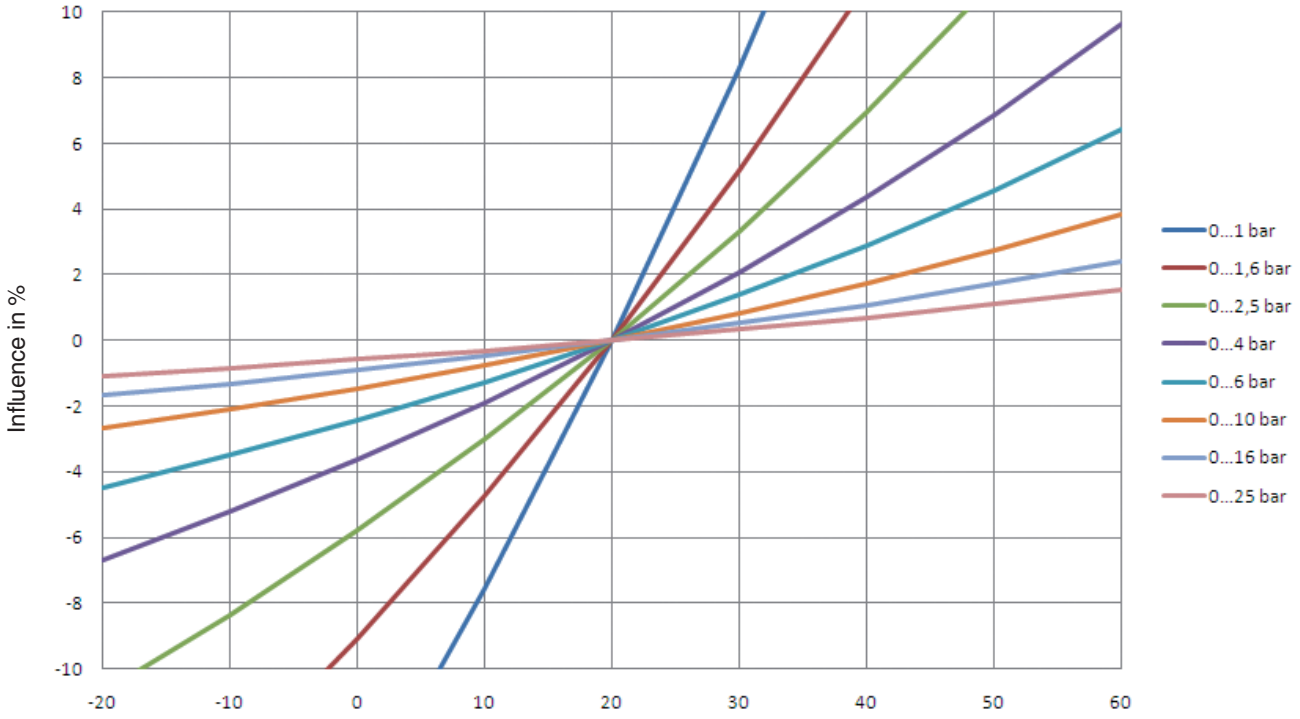


Illustration 5

Temperature in °C

Filled to 90 % with silicone oil

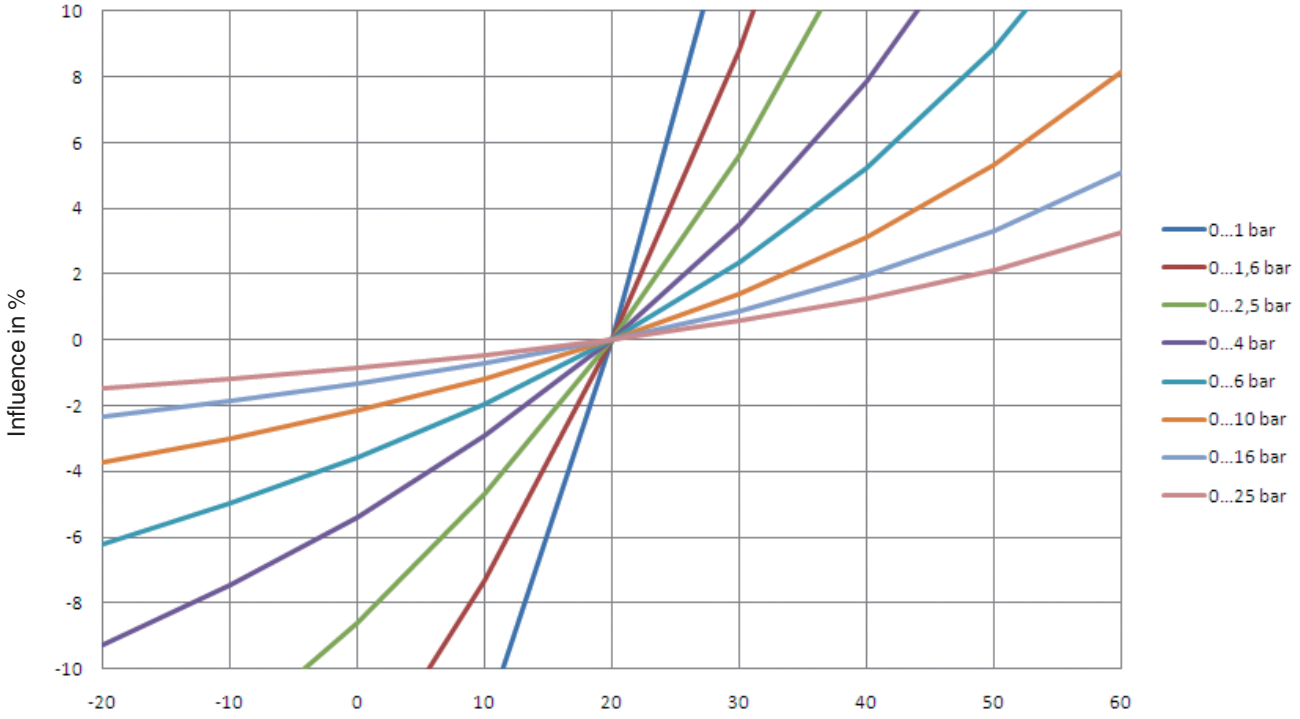


Illustration 6

Temperature in °C

5.2 Temperature error with unfilled and filled diaphragm pressure gauges

With model 4, 5 and 7 hermetically sealed diaphragm pressure gauges, the temperature error for scale ranges ≥ 100 mbar is negligible. For scale ranges < 100 mbar we recommend only using instruments with a pressure compensation diaphragm.

For instrument models 73x.14, 702.01/02/03, 700.01/02 and 7x2.15, due to their mechanical design, there are no additional temperature errors.

5.3 Model overview

Pressure gauges for which the formation of condensation and the ingress of water from the outside can be prevented:

Influence	Bourdon tube pressure gauges					Diaphragm pressure gauges					
	Model 232.50 Model 232.30		Model 233.50 filled Model 233.30 filled		Model 233.30 filled, with pressure compensation diaphragm	Model 4 and 7		Model 4 and 7 filled		Model 4 and 7 with pressure compensation diaphragm	Model 4 and 7 filled, with pressure compensation diaphragm
	≥ 25 bar	< 25 bar	≥ 25 bar	< 25 bar	all pressure ranges	> 100 mbar	< 100 mbar	> 100 mbar	< 100 mbar	all pressure ranges	all pressure ranges
Formation of condensation	unavoidable		✓	✓	✓	unavoidable		✓	✓	unavoidable	✓
Hermetically sealed [1]	Influence negligible	For influence see illustration 4	Influence negligible	For influence see illustration 5 or 6	✓	Influence negligible	Technically not solvable	Influence negligible	Technically not solvable	✓	✓

1) Hermetically sealed = airtight case

Illustration 7

6. Pressure compensation diaphragm

As can be seen in illustration 7, formation of condensation in filled pressure gauges can be prevented by the use of pressure compensation diaphragms, without any temperature error. Pressure compensation diaphragms can be used for all safety pressure gauges per EN 837-1 S3.

Illustration 8: Rear wall of case with pressure compensation diaphragm, nominal size 63

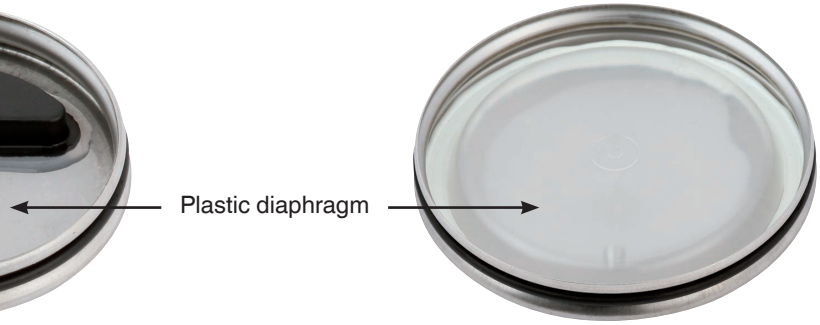


Illustration 9: Rear wall of case with pressure compensation diaphragm, nominal size 100

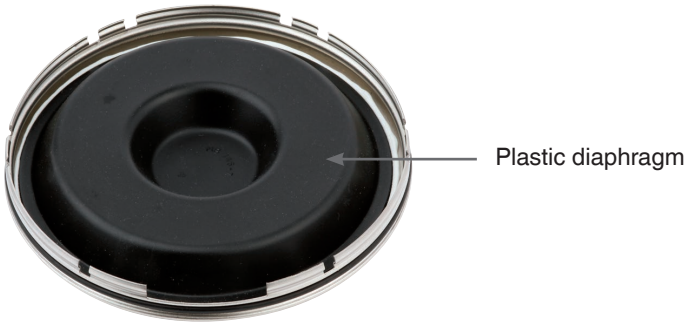


Illustration 10: Rear wall of case with pressure compensation diaphragm for contact gauges, nominal size 160

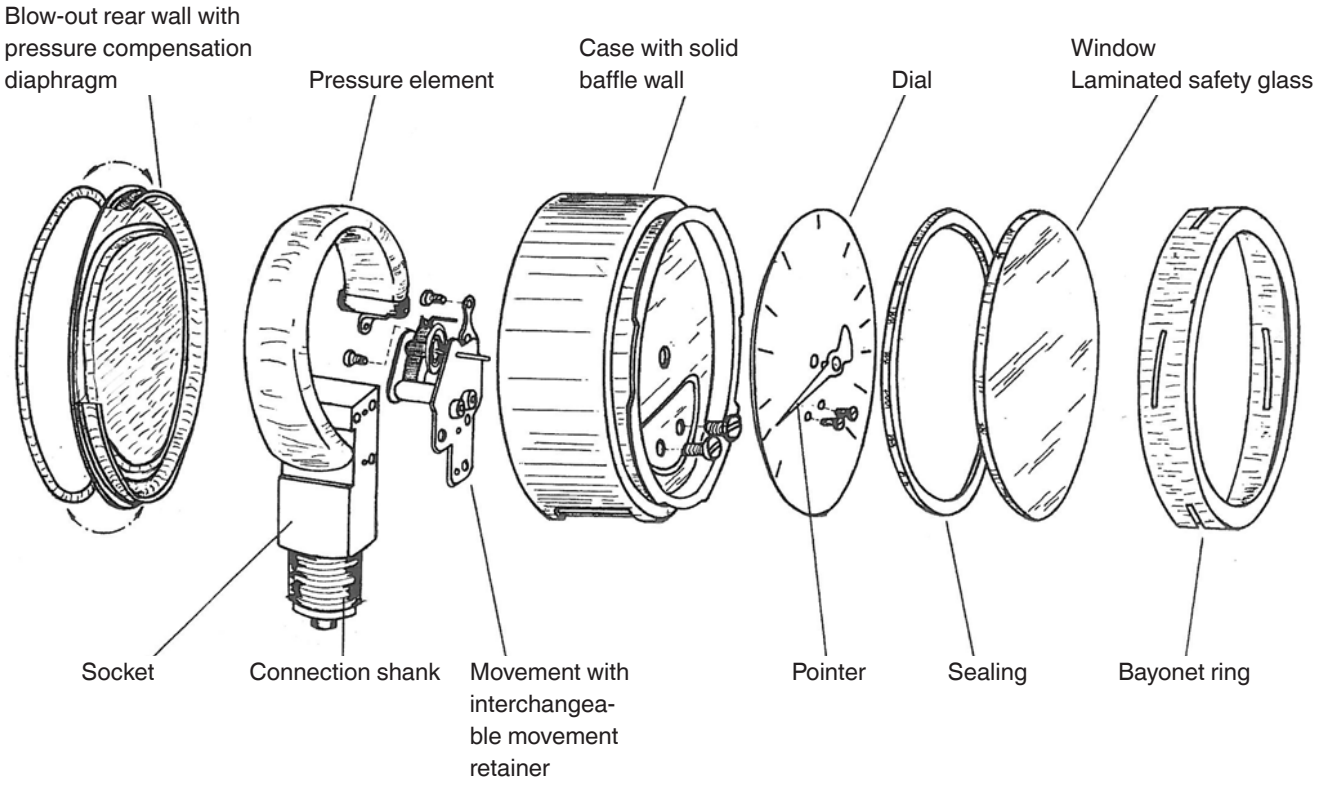


Illustration 11: Exploded view drawing

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06/2016 EN

OEM compact pressure switch With settable hysteresis Model PSM02

Applications

- Hydraulics and mobile hydraulics
- Pneumatics
- Plastics injection moulding machines
- General machine building and plant construction
- Media: Compressed air, neutral and self-lubricating fluids, neutral gases

Special features

- High reproducibility
- Compact design
- Setting ranges -0.85 ... -0.15 bar and from 0.2 … 2 bar to 40 … 400 bar
- Long service life due to high-quality micro switch
- Settable hysteresis

OEM compact pressure switch, with settable hysteresis, model PSM02

Description

Model PSM02 screw-in pressure switches in a diaphragm or piston variant open or close a circuit, depending on whether the pressure is dropping or rising. Two adjustment screws enable easy and convenient on-site setting of the required switch point and hysteresis. Optionally, WIKA offers its customers the factory setting of switch point and hysteresis.

Model PSM02 mechanical pressure switches are employed wherever compressed air, neutral and self-lubricating fluids or neutral gases are used and a precisely set hysteresis is needed.

The high reproducibility of the switch point of ±2 % and the settability of the hysteresis makes the model PSM02 pressure switches interesting for all customers who place a value on precision as well as an attractive price.

Standard version

Case
Steel, galvanised

Reproducibility
±2 % of full scale value

Permissible temperature
Ambient: -20 … +80 °C
Medium: -20 … +80 °C

Process connection
Steel, galvanised
G 1/8, G 1/4, 1/8 NPT, 1/4 NPT, R 1/8 or M10 x 1

Measuring element
Diaphragm or piston with compression spring

Sealing
Diaphragm: NBR or EPDM
Piston: PTFE (dynamic) and NBR, EPDM or Viton® (static)

Viton® fluoroelastomer is a registered trademark of DuPont Performance Elastomers.

Switch contacts
High-quality snap-action switch, self-cleaning

Switching function
Selectable: Normally open, normally closed, change-over contact

Electrical rating

Current utilization [1]	Voltage			Current
	Angular connector	M 12 x 1, cable	All	
Resistive load AC-12, DC 12	AC 250 V	AC 48 V	DC 24 V	4 A
Inductive load AC-14, DC 14	AC 250 V	AC 48 V	DC 24 V	2 A

1) per DIN EN 60947-1

Electrical connection
Angular connector DIN 175301-803 A

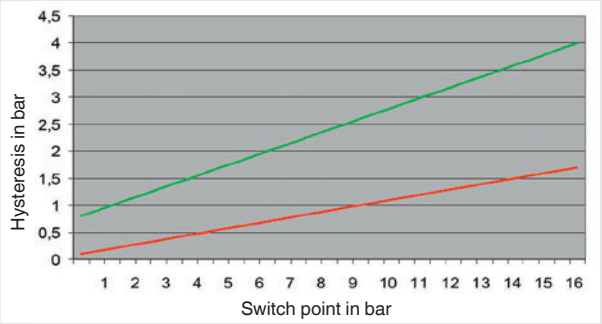
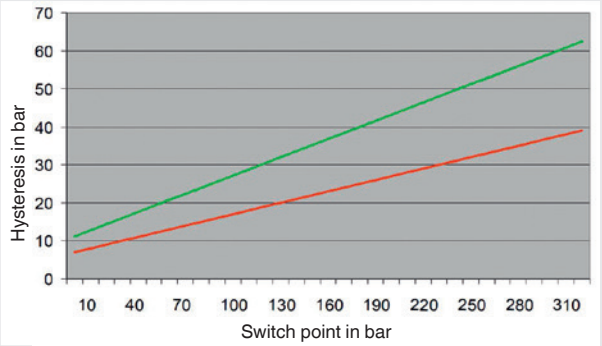
Switching frequency
max. 100/min

Service life
> 2 x 10^6 switching cycles

Ingress protection
IP65 (IP67 with electrical connection M12 x 1 [2] or cable)

2) The stated ingress protection (per IEC/EN 60529) only applies when plugged in using mating connectors that have the appropriate ingress protection.

Setting ranges, max. working pressure, measuring principle, hysteresis

Setting range in bar	Max. working pressure in bar	Measuring principle	Hysteresis
0,2 ... 2	60	Diaphragm	 Example: With a switch point of 4 bar, a switch-back difference (hysteresis) of a minimum 0.5 bar to a maximum of 1.5 bar can be set.
0,5 ... 8			
1 ... 16			
10 ... 30	350	Piston	 Example: With a switch point of 100 bar, a switch-back difference (hysteresis) of a minimum 18 bar to a maximum of 28 bar can be set.
10 ... 80			
10 ... 160			
20 ... 250			
30 ... 320			
40 ... 400	420		

Options

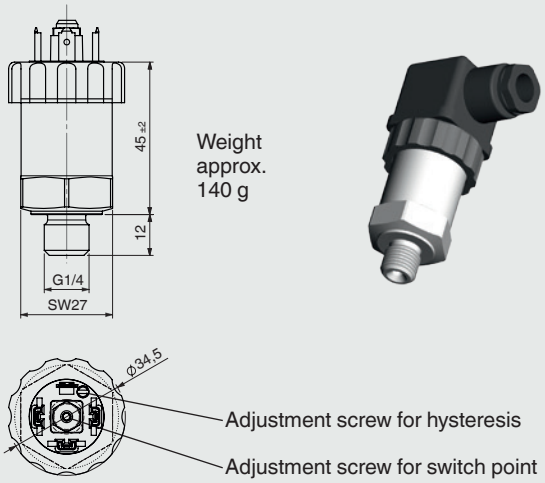
- Factory setting of switch point and hysteresis
- Case and process connection from stainless steel
- Other process connection
- Other materials on request
- Electrical connection M12 x 1 or cable
- Permissible ambient and medium temperature
  -30 ... +100 °C

Dimensions in mm

Standard version

Electrical connection

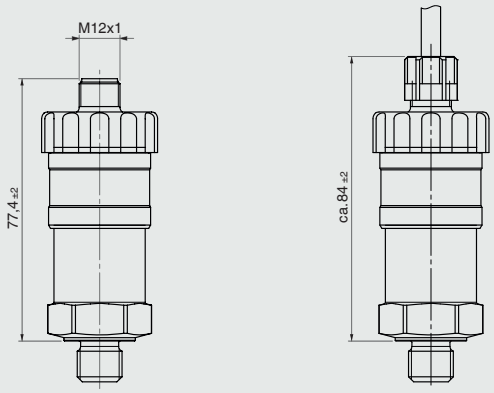
Angular connector DIN 175301-803 A



Option

Electrical connection

M12 x 1 Cable



Ordering information

Model / Setting range / Switching function / Process connection / Sealing / Electrical connection / Options

06/2017 EN

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APP704
PNEUMATIC WATER VALVE FOR U231.K
PART NUMBERS:

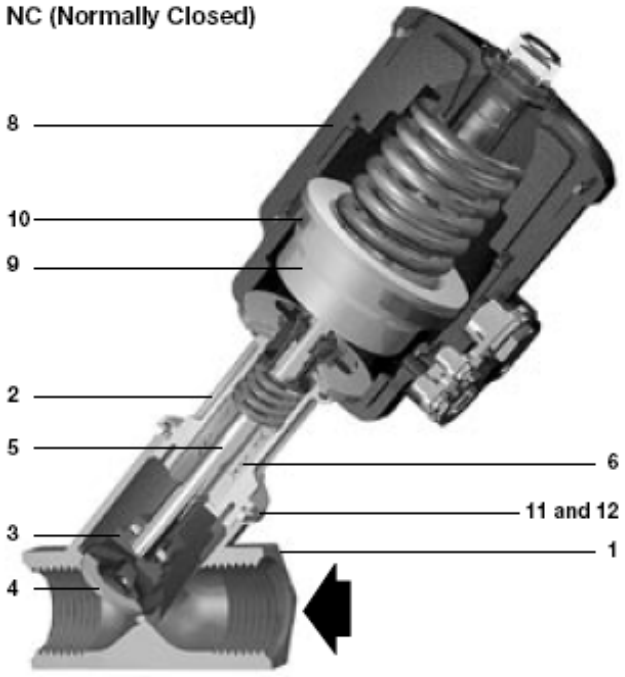
	PORT SIZE	BODY MATERIAL
98650.2584.1	1” BSP	BRONZE
98650.2584.2	1” BSP	STAINLESS STEEL
98650.2585.1	¾” BSP	BRONZE
98650.2585.2	¾” BSP	STAINLESS STEEL
98650.2612	1 ½” BSP	BRONZE

DESCRIPTION
A 2-port pneumatically actuated on/off valve for use on water, air, oil and gasses.
A pneumatic signal acts on the actuator piston to open or close the valve with a spring return action. The valve plugs have a PTFE soft seal to provide a tight shut-off. A valve position indicator is included on standard and flow regulator models.

The valves are normally closed and flow is from port 1 to port 2.

BRONZE BODY

NO	PART	MATERIAL
1	BODY	BRONZE
2	BONNET	BRASS
3	PLUG	STAINLESS STEEL
4	PLUG SEAL	PTFE
5	VALVE STEM	STAINLESS STEEL
6	STEM SEALS	PTFE CHEVRONS
7	STEM O-RING	VITON
8	ACTUATOR HOUSING	GLASS FILLED POLYMIDE
9	PISTON	GLASS FILLED POLYMIDE
10	PISTON LIP SEAL	VITON
11	GASKET	PTFE
12	O-RING	FKM



STAINLESS STEEL BODY

NO	PART	MATERIAL
1	BODY	STAINLESS STEEL
2	BONNET	STAINLESS STEEL
3	PLUG	STAINLESS STEEL
4	VALVE PLUG SEAL	TFM 1600
5	VALVE STEM	STAINLESS STEEL
6	STEM SEAL	PTFE + FKM CHEVRON
7	STEM O-RING	FKM
8	ACTUATOR HOUSING	30% GLASS FILLED POLYMIDE
9	PISTON	50% GLASS FILLED POLYMIDE
10	PISTON LIP SEAL	NBR
11	GASKET	PTFE
12	O-RING	FKM

This manual will be used on these parts below:
WIKA reference number: 213.53.63
Gardner Denver Part Number:

98288.1001
98288.1002
98288.1003
98288.1004
98288.1005
98288.1026
98288.1027
98288.1028
98288.1031
98288.1032
98288.1077
98288.1104
98288.1129
98288.1130
98288.1137
98288.1161
98288.1301
98288.1302
98288.1303

Operating instructions **GB**

Pressure gauge models 1 and 213 per directive 94/9/EC (ATEX)

II 2 GD c TX

31014275.01 08/2011 GB/D

WIKA

Part of your business

Contents

Declarations of conformity see www.wika.com
Specifications: see data sheet on www.wika.com
Subject to technical modifications.

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1. Safety

WARNING!
Before installation, commissioning and operation, ensure that the appropriate pressure gauge has been selected in terms of measuring range, design and specific measuring conditions.

- Check the compatibility with the medium of the materials subjected to pressure!
- In order to guarantee the measuring accuracy and long-term stability specified, the corresponding load limits must be observed.
- Non-observance can result in serious injury and/or damage to the equipment.
- Only qualified persons authorised by the plant manager are permitted to install, maintain and service the pressure gauges.

2. Description

- Nominal sizes

Model 111.10:	NS 40, 50, 63, 80, 100, 160	Model 113.53:	NS 40, 80, 100
Model 111.11/16:	NS 40, 50, 63	Model 213.40:	NS 63, 80
Model 111.12:	NS 40, 50, 63, 80, 100	Model 213.53:	NS 50, 63

- The instruments measure the pressure by means of resilient Bourdon tube pressure elements
- The measuring characteristics are in accordance with the EN 837-1 standard

3. Specifications and intended use

Pressure limitation

Steady: 3/4 x full scale value
Fluctuating: 2/3 × full scale value
Short time: Full scale value

Mechanical connection

In accordance with the general technical regulations for pressure gauges (e.g. EN 837-2 "Selection and installation recommendations for pressure gauges").

When screwing gauges in, the force required for this must not be applied through the case, but rather through the spanner flats (using a suitable tool) provided for this purpose on the square shaft of standard connections.

Installation with open-ended spanner

Correct sealing of pressure gauge connections with parallel threads ① must be made using suitable flat gaskets, sealing rings or WIKA profile sealings. The sealing of tapered threads (e.g. NPT threads) is made by providing the thread ② with additional sealing material such as, for example, PTFE tape (EN 837-2).

The torque depends on the seal used. Connecting the gauge using a clamp socket or a union nut is recommended, so that it is easier to orientate the gauge correctly.

When a blow-out device is fitted to a pressure gauge, it must be protected against being blocked by debris and dirt.

After mounting, set the compensating valve (if available) from CLOSE to OPEN.

Temperature effect

When the temperature of the measuring system deviates from the reference temperature (+20 °C):
max. ±0.4%/10 K of full scale value

Ingress protection per EN 60529 / IEC 529

Model 111.xx:	IP 42
Models 113.53, 213.40 and 213.53:	IP 65

Permissible temperatures

Ambient:

Model 111.xx:	-40 ... +60 °C
Models 113.53, 213.40 and 213.53:	-20 ... +60 °C

Medium: max. +60 °C

Attention! With gaseous substances, the temperature may increase as a result of compression warming. In these cases it may be necessary to throttle the rate of change of pressure or reduce the permissible medium temperature.

The effective maximum surface temperature is not only dependant upon these instruments, but mainly on the respective medium temperature!

Materials

Wetted parts:	Cu-alloy	
Movement:	Cu-alloy	
Dial:	NS 40, 50, 63: Plastic NS 80, 100, 160: Aluminium	
Pointer:	Plastic (NS 160: Aluminium)	
Case:	Models 111.10, 111.12, 111.16: Model 111.11: Models 113.53, 213.53: Model 213.40:	Plastic Steel Stainless steel Forged brass
Window:	Plastic (NS 160: Instrument glass)	

Installation

- Nominal position per EN 837-1 / 9.6.7 Figure 9: 90° (⊥)
- Process connection lower mount (LM) or back mount (BM)
- In order to avoid any additional heating, the instruments must not be exposed to direct solar irradiation while in operation!
- Pressure gauges must be earthed via the process connection!

Permissible ambient and operating temperatures

When mounting the pressure gauge it must be ensured that, taking into consideration the influence of convection and heat radiation, no deviation above or below the permissible ambient and medium temperatures can occur. The influence of temperature on the indication accuracy must be observed.

Permissible vibration load at the installation site

- The instruments should always be installed in locations free from vibration.
- If necessary, it is possible to isolate the instrument from the mounting point by installing a flexible connection line between the measuring point and the pressure gauge and mounting the instrument on a suitable bracket.
- If this is not possible, the following limit values must not be exceeded:

Dry gauges:	Frequency range < 150 Hz
(Model 111)	Acceleration < 0.7 g (7 m/s²)
Liquid-filled gauges:	Frequency range < 150 Hz
(Model 113, 213)	Acceleration < 4 g (40 m/s²)

The liquid filling must be checked on a regular basis.
The liquid level must not drop below 75 % of the gauge diameter.

4. Commissioning

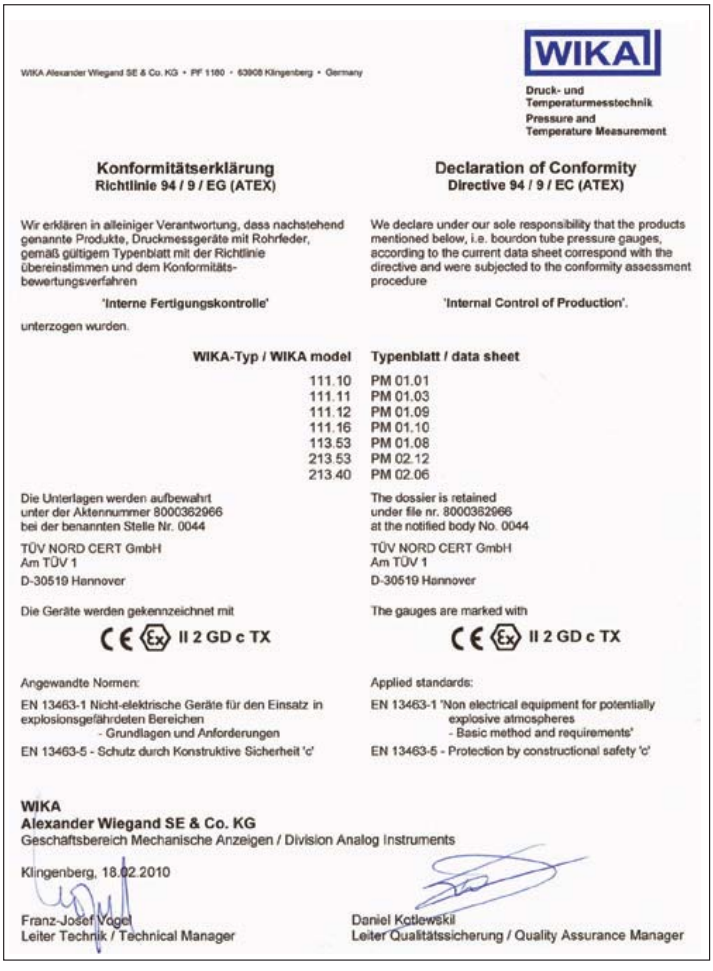
During the commissioning process pressure surges must be avoided at all costs. Open the shut-off valves slowly.

5. Maintenance and cleaning

- The instruments are maintenance-free.
- The indicator should be checked once or twice every year. For this the instrument must be disconnected from the process to check with a pressure testing device.
- Clean the pressure gauge with a moist cloth.
- Repairs must only be carried out by the manufacturer or appropriately qualified skilled personnel.
- When dismounting, close the compensating valve (if available).

WARNING!
Residual media in dismounted pressure gauges can result in a risk to persons, the environment and equipment.
Take sufficient precautionary measures.

Appendix 1: Declaration of conformity



WIKA Alexander Wiegand SE & Co. KG • PF 1180 • 63908 Klingenberg • Germany

WIKA
Druck- und Temperaturmesstechnik
Pressure and Temperature Measurement

Konformitätserklärung
Richtlinie 94 / 9 / EG (ATEX)

Wir erklären in alleiniger Verantwortung, dass nachstehend genannte Produkte, Druckmessgeräte mit Rohrfeder, gemäß gültigem Typenblatt mit der Richtlinie übereinstimmen und dem Konformitäts-bewertungsverfahren

'Interne Fertigungskontrolle'

unterzogen wurden.

Declaration of Conformity
Directive 94 / 9 / EC (ATEX)

We declare under our sole responsibility that the products mentioned below, i.e. bourdon tube pressure gauges, according to the current data sheet correspond with the directive and were subjected to the conformity assessment procedure

'Internal Control of Production'.

WIKA-Typ / WIKA model	Typenblatt / data sheet
111.10	PM 01.01
111.11	PM 01.03
111.12	PM 01.09
111.16	PM 01.10
113.53	PM 01.08
213.53	PM 02.12
213.40	PM 02.06

Die Unterlagen werden aufbewahrt unter der Aktennummer 8000362966 bei der benannten Stelle Nr. 0044

TÜV NORD CERT GmbH
Am TÜV 1
D-30519 Hannover

The dossier is retained under file nr. 8000362966 at the notified body No. 0044

TÜV NORD CERT GmbH
Am TÜV 1
D-30519 Hannover

Die Geräte werden gekennzeichnet mit

CE Ex II 2 GD c TX

The gauges are marked with

CE Ex II 2 GD c TX

Angewandte Normen:

EN 13463-1 Nicht-elektrische Geräte für den Einsatz in explosionsgefährdeten Bereichen - Grundlagen und Anforderungen

EN 13463-5 - Schutz durch Konstruktive Sicherheit 'c'

Applied standards:

EN 13463-1 'Non electrical equipment for potentially explosive atmospheres - Basic method and requirements'

EN 13463-5 - Protection by constructional safety 'c'

WIKA
Alexander Wiegand SE & Co. KG
Geschäftsbereich Mechanische Anzeigen / Division Analog Instruments

Klingenberg, 18.02.2010

Franz-Josef Vogel
Leiter Technik / Technical Manager

Daniel Kotlewski
Leiter Qualitätssicherung / Quality Assurance Manager

This manual will be used on these parts below:

WIKA reference number: 232.30.63
Gardner Denver Part Number:
98288.1139,98288.1140,98288.1141,98288.1142,98288.1143,98288.1144,
98288.1145,98288.1147, 98288.1150

WIKA reference number: 232.50.63
Gardner Denver Part Number:
98288.1086

WIKA reference number:
233.50.63
Gardner Denver Part Number:
98288.1242 98288.1246
98288.1247 98288.1248
98288.1249 98288.1250
98288.1168

WIKA refere
8288.1264nce number: 233.53.63
Gardner Denver Part Number:

98288.1016 98288.1017 98288.1019 98288.1020 98288.1021 98288.1022
98288.1023 98288.1128 98288.1131 98288.1132 98288.1133 98288.1134
98288.1135 98288.1136 98288.1232 98288.1237 98288.1305 98288.1306
98288.1307 98288.1308 98288.1309 98288.1312

WIKA reference number: 612.20.63
98288.1174

Gardner Denver

Operating instructions GB

Pressure gauge model 2 NS 63 per directive 94/9/EC (ATEX)

II 2 GD c TX

2094366.05 01/2011 GB/D

WIKA
Part of your business

Contents

Declarations of conformity see www.wika.de.

Specifications: see data sheet on www.wika.de

Subject to technical modifications.

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E-Mail info@wika.de
www.wika.de

1. Safety

WARNING!
Before installation, commissioning and operation, ensure that the appropriate pressure gauge has been selected in terms of measuring range, design and specific measuring conditions.

- The compatibility of the materials under pressure with the medium must be checked!
- In order to guarantee the measuring accuracy and long-term stability specified, the corresponding load limits must be observed.
- Serious injuries and/or damage can occur should these not be observed.
- Only qualified persons authorised by the plant manager are permitted to install, maintain and service the pressure gauges.

2. Description

- Nominal size 63 mm
- The gauges measure the pressure by means of resilient bourdon tube pressure elements
- The measuring characteristics are in accordance with EN 837-1 standard
- In addition, the enclosing and the pressurised components of models 23x.30 also meet the requirements of this standard, relating to safety pressure gauges with a solid baffle wall (code S3).

3. Specifications and intended use

Pressure limitation

Model 23x.50/53:

Steady:	3/4 × full scale value
Fluctuating:	2/3 × full scale value
Short time:	full scale value

Model 23x.30:

Steady:	full scale value
Fluctuating:	0.9 × full scale value
Short time:	1.1 × full scale value

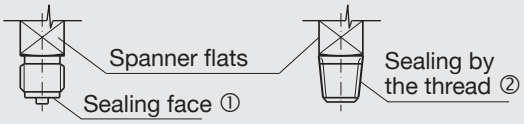
Mechanical connection

In accordance with the general technical regulations for pressure gauges (i.e. EN 837-2 "Selection and installation recommendations for pressure gauges").

When screwing gauges in, the force required for this must not be applied through the case, but rather through the spanner flats (using a suitable tool) provided for this purpose on the square shaft of standard connections.

Installation with spanner

Correct sealing of pressure gauge connections with parallel threads ① must be made using suitable sealing rings, sealing washers or WIKA profile seals. The sealing of tapered threads (e.g. NPT threads) is made by providing the thread ②, with additional sealing material such as, for example, PTFE tape (EN 837-2).



The torque depends on the seal used. Connecting the gauge using a clamp socket or a union nut is recommended, so that it is easier to orientate the gauge correctly.

When a blow-out device is fitted to a pressure gauge, it must be protected against being blocked by debris and dirt. With safety pressure gauges (see dial symbol Ⓢ) it must be ensured that the free space behind the blow-out back is at least 15 mm.

After mounting, set the compensating valve (if available) from CLOSE to OPEN.

Temperature effect

When the temperature of the measuring system deviates from the reference temperature (+20 °C): max. ±0.4 %/10 K of full scale value

IP Ingress protection

Enclosing case IP 65 (EN 60529 / IEC 529)

Operating temperature

Ambient: Model 232 -40 ... +60 °C
Model 233 -20 ... +60 °C

Medium: The permissible medium temperature does not only depend on the instrument design, but also on the ignition temperature of the surrounding gases, vapours or dust. Both aspects have to be taken into account. For permissible maximum medium temperatures see table 1

Attention! In the case of gaseous substances, the temperature may increase due to compression warming. In these cases it may be necessary to throttle the rate of change of pressure or reduce the permissible medium temperature.

Table 1: Permissible medium temperature

Temperature class of the ambient atmosphere (ignition temperature)	Maximum permissible medium temperature (in the measuring system)	
	Models 232 (dry gauges)	Models 233 (liquid-filled gauges)
T 6 (85 °C < T ≤ 100 °C)	+70 °C	+70 °C
T 5 (100 °C < T ≤ 135 °C)	+85 °C	+85 °C
T 4 (135 °C < T ≤ 200 °C)	+120 °C	+100 °C
T 3 (200 °C < T ≤ 300 °C)	+185 °C	+100 °C
T 2 (300 °C < T ≤ 450 °C)	+200 °C	+100 °C
T 1 (T > 450 °C)	+200 °C	+100 °C

The effective maximum surface temperature is not only dependant upon these instruments, but mainly on the respective medium temperature!

Materials

Wetted parts: Stainless steel
Movement: Stainless steel
Dial and pointer: Aluminium
Case, bezel ring: Stainless steel (model 23x.30: with blow-out back)
Window: Laminated safety glass

Installation

- Nominal position per EN 837-1 / 9.6.7 figure 9: 90° (⊥)
- Process connection lower mount (LM) or back mount (BM)
- In order to avoid any additional heating, the instruments must not be exposed to direct solar irradiation while in operation!
- Pressure gauges must be earthed via the process connection!

Permissible ambient and operating temperatures

When mounting the pressure gauge it must be ensured that, taking into consideration the influence of convection and heat radiation, no deviation above or below the permissible ambient and medium temperatures can occur. The influence of temperature on the display accuracy must be observed.

Permissible vibration load at the installation site

- The instruments should always be installed in locations free from vibration.
- If necessary, it is possible to isolate the instrument from the mounting point by installing a flexible connection line between the measuring point and the pressure gauge and mounting the instrument on a suitable bracket.
- If this is not possible, the following limit values must not be exceeded:

Dry gauges: (Model 232)	Frequency range < 150 Hz Acceleration < 0.7 g (7 m/s²)
Liquid-filled gauges: (Model 233)	Frequency range < 150 Hz Acceleration < 4 g (40 m/s²)

The liquid filling must be checked on a regular basis.
The liquid level must not drop below 75 % of the gauge diameter.

4. Commissioning

During the commissioning process pressure surges must be avoided at all costs. Open the shut-off valves slowly.

5. Maintenance and cleaning

- The instruments are maintenance-free.
- The indicator and switching function should be checked once or twice every year. The gauge must be disconnected from the process to check with a pressure testing device.
- Clean the pressure gauge with a moist cloth.
- Repairs must only be carried out by the manufacturer or appropriately qualified skilled personnel.
- When dismounting, close the compensating valve (if available).

WARNING!
Residual media in dismounted pressure gauges can result in a risk to persons, the environment and equipment.
Take sufficient precautionary measures.

Appendix 1: Declaration of conformity

WIKA

EG-Konformitätserklärung

Dokument Nr.:

11575400.01

Wir erklären in alleiniger Verantwortung, dass die mit CE gekennzeichneten Produkte

Typ:

232.30.063 / 233.30.063
232.50.063 / 233.50.063
232.53.063 / 233.53.063

Beschreibung:

Druckmessgeräte mit Rohrfeder

gemäß den gültigen Datenblättern:

PM 02.04
PM 02.02
PM 02.12

die grundlegenden Schutzanforderungen der folgenden Richtlinie(n) erfüllen:

94/9/EG (ATEX)

Kennzeichnung:

II 2 GD c TX

Die Geräte wurden entsprechend den folgenden Normen geprüft [1]:

EN 1127-1:2007
EN 13463-1:2009
EN 13463-5:2003

[1] Konformitätsbewertungsverfahren
‚Interne Fertigungskontrolle'

Dokumentation hinterlegt bei benannter Stelle 0044
Aktennummer 8000550026

Unterzeichnet für und im Namen von / Signed for and on behalf of

WIKA Alexander Wiegand SE & Co. KG

Klingenberg, 2010-04-29

Geschäftsbereich / Company division: MP-PG

Armin Hawlik

Unterschrift, autorisiert durch das Unternehmen / Signature authorized by the company

EC Declaration of Conformity

Document No.:

11575400.01

We declare under our sole responsibility that the CE marked products

Model:

232.30.063 / 233.30.063
232.50.063 / 233.50.063
232.53.063 / 233.53.063

Description:

Bourdon Tube Pressure Gauges

according to the valid data sheets:

PM 02.04
PM 02.02
PM 02.12

are in conformity with the essential protection requirements of the directive(s)

94/9/EC (ATEX)

Marking:

II 2 GD c TX

The devices have been tested according to the following standards [1]:

EN 1127-1:2007
EN 13463-1:2009
EN 13463-5:2003

[1] Conformity assessment procedure
‚Internal Control of Production'

Documentation deposited at notified body 0044
Reference number 8000550026

Qualitätsmanagement / Quality management: MP-PG

Joachim Ackermann

THERMOMETER – SLIM LINE DIAL TYPE

TECHNICAL DATA

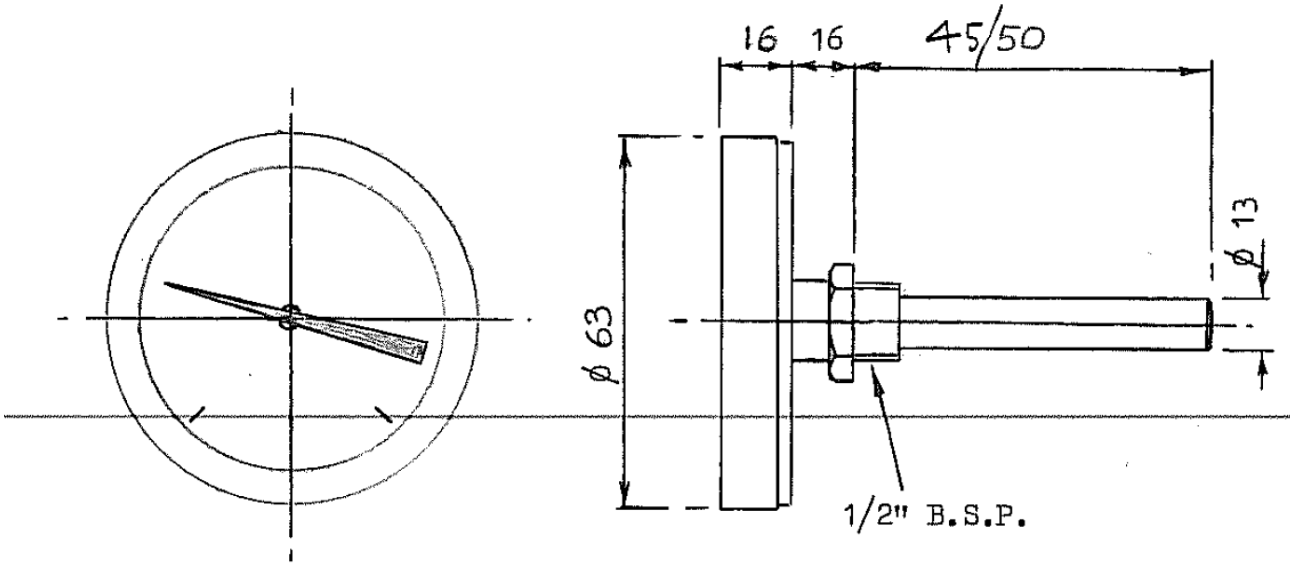
Supplier:	SM GAUGE COMPANY
Gardner Denver Part Number:	98288.1014
Description	Thermometer- Slim Line Dial Type
REF No.	98288.1014
Range	-30 °C to +60 °C

To be supplied with brass pocket, pressure tested to 500lb.f./in^2.

ALT:-

Range	-10 °C to +80 °C

To be supplied with Stainless Steel pocket.



S.M. GAUGE COMPANY

SM Gauge Company Ltd **308 – 312 Lodge Causeway,** **Fishponds, Bristol,** **BS16 3RD**	**Tel: 0117 965 4615** **Fax: 0117 958 3660** **email sales@pressuregauge.co.uk** **web: www.pressuregauge.co.uk**

INSTALLATION & OPERATION

MATERIALS.

Standard stainless steel bulbs and thermowells are suitable for air, oil, water and other non-corrosive fluids. HVAC Thermometers must be used with their brass or stainless steelthermowell.
For corrosive fluids, alternative materials e.g. PTFE and Hastalloy etc. should be specified.
Environmental conditions should be taken into account when considering suitable materials for cases, capillary etc.

AMBIENT TEMPERATURE.

Instruments are designed to operate in ambient temperatures of-10 to + 50°C. The housing has been equipped with a bimetal temperature compensation. The instrument head and capillary should be protected from localised heal or cold sources as this can lead to indicating errors

THERMOWELLS.

The use of thermowells is recommended in all applications.
The correct specification for thermowells is dependent upon a number of factors (e.g. temperature flow medium, vibration etc.) and it is recommended each application be discussed with SM Gauge Co. to ensure correct selection.

INSTALLATION.

Care must be taken to ensure that the bulb is not damaged during installation. Do not attempt to bend bulb. The sensing bulb should be totally immersed in the medium which is being measured If a thermowell is being used, the heat transfer delay can be improved by filling the thermowell with heat transfer substance. When fitting the bulb into a thermowell it is essential the bulb is not forced against the bottom of the thermowell when tightening the nut. This can lead to increase in pressure within the bulb and cause incorrect readings. The bulb should be inserted into the thermowell until it bottoms and then withdrawn approximately 5 mm before tightening compression nut to hand tight plus quarter turn. Check capillary is correct length by laying along proposed route. Never attempt to stretch capillary as this will lead to fracture of the system.
The capillary should be securely supported and clipped to wall or other solid surface and must be free from buckling and twists and have minimum bending radius of 60mm. Particular care should be taken at the points where the capillary enters the case and the bulb. Excess capillary should be coiled and arranged in free swinging loops between the last fixing point and the bulb.
Do not tighten instrument into the system by grasping the case, as any distortion created will lead to calibration errors. Instrument heads should be mounted in the vertical position unless calibrated accordingly.

VIBRATION.

A temperature indicator should be installed in a vibration free area. The instrument might exhibit excessive wear on the bearing surfaces of the movement if not. Glycerine filling maybe an option, consult the SM Gauge Co.

THREADS AND JOINTING.

Care must be taken to ensure mismatch of threads does not occur. Mating female connections must have a pressure rating that is compatible with the pressure rating of the instrument.

MAINTENANCE.

The function of the gauge does not require any special maintenance procedures but frequent checks must be made to ensure that the instrument is still working correctly and accurately. Any shift in temperature readings greater than twice the tolerance of the instrument must be investigated and the immediate replacement of the gauge if it is faulty.

CALIBRATION AND REPAIR.

The repair and calibration of the instrument should be undertaken by competent personnel, who have at their disposal the necessary facilities. If not, they should be returned to SM Gauge Co. For repair and/or calibration.

STORAGE.

Instruments should be stored in dry, clean conditions and care should be taken to ensure the ambient temperature does not exceed or fall below the measuring range of the instruments. They must be protected against any impact damage.

TRANSPORT.

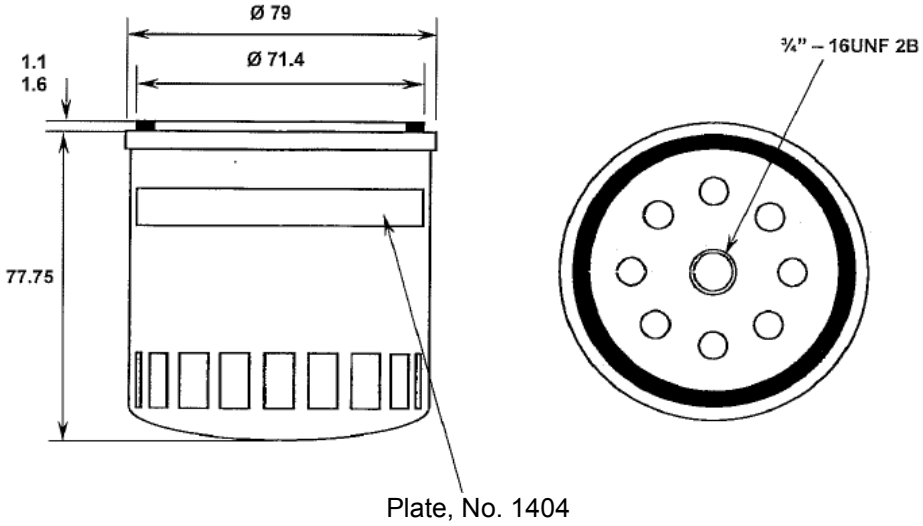
Although care is taken in packing these instruments for shipment it is possible they can sustain transit damage. They should be checked for damage before use.

OIL FILTER – EFL89

Technical Data

Gardner Denver Part Number:	98262.1009
Description	Oil Filter
REF No.	EFL89
Filtration	15/20 Micron
Plate Number	1404

Illustration



All dimensions in mm's except where otherwise stated.

Operating and Maintenance

Replace every 1000 hours, and when changing compressor oil.

To Assemble:
Apply a film of oil to sealing ring, hand turn until ring contacts.
Then tighten a further ½ to ¾ turn.
Check for leaks after 5 minutes running.

Gardner Denver

HIGH PRESSURE SOLUTIONS

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Designed for Integration

Perfect With Pressure

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- Market leading 1,500 hour service intervals

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- Bespoke training packages

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For more than 155 years, Gardner Denver has been a leading global provider of compressors, blowers and vacuum pumps. OEMs and end-users from every corner of the world rely on us for their business solutions.

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ENGINE START	INDUSTRIAL AIR + GAS	MARINE + OFFSHORE	DEFENCE

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For additional information please contact Gardner Denver or your local representative.

Specifications subject to change without notice.

G7 75GB