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## TECHNICAL BULLETIN

# COMPAIR COMPRESSORS SAFETY IMPROVEMENT

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THE PRESENT TECHNICAL BULLETIN CONTAINS TECHNICAL INFORMATION AIMED TO SUPPORT/IMPROVE DRASS EQUIPMENT CURRENTLY IN OPERATION.

YOU ARE KINDLY REQUESTED TO:

- COMMUNICATE IF THIS DOCUMENT AND THOSE FOLLOWING SHOULD BE SENT TO DIFFERENT E-MAIL ADDRESSES.
- REVERT FOR ANY CLARIFICATION NEEDED.
- INVOLVE DRASS FOR THE IMPLEMENTATION OF SUGGESTED MODIFICATIONS (IF ANY).
- ALWAYS INFORM DRASS OF ANY MODIFICATIONS TO DRASS EQUIPMENT IN ORDER TO VERIFY SAFETY, ALLOW TRACEABILITY AND LIFE CYCLE SUPPORT.

PLEASE NOTE THAT TECHNICAL BULLETINS WILL BE AVAILABLE AT [WWW.DRASS.IT](http://WWW.DRASS.IT) FOR PERMANENT CONSULTATION.

### REASON FOR ISSUE

THE IMPROVEMENTS SUGGESTED ARE INTENDED TO AVOID SAFETY ISSUES CAUSED BY OIL CONTAMINATION BY BREATHING GAS WHEN THE COMPRESSOR



IS WORKING IN VACUUM AND THEREFORE THERE IS POTENTIAL PULLING OF OIL THROUGH THE SEALS.

IT HAS BEEN HIGHLIGHTED THAT COMPRESSORS MAY BE WORKING BELOW THE MINIMUM SUCTION PRESSURE. THIS MAY BE CAUSED BY EXCESSIVE PRESSURE LOSS IN THE GAS LINE DUE TO ITS SIZE, LENGTH OR OTHER INSTALLATION ISSUES AND BY A LACK OF PROTECTION IN THE MACHINE CONTROL AND SAFETY SYSTEM.

SUGGESTED IMPROVEMENTS AIM TO SOLVE ALL POTENTIALLY DANGEROUS SITUATIONS; FIRSTLY, TO PREVENT THE COMPRESSOR FROM WORKING BELOW MINIMUM SUCTION PRESSURE AND ALSO TO INCREASE COMPRESSOR'S SAFETY IN CASE OF A LOW PRESSURE OCCURRENCE WHICH CAN BE CAUSED BY:

- FAILURE OF THE COMPRESSOR'S AUTOMATIC STOPPING SYSTEM FOR THE EMPTYING OF THE GAS BAG (FOR EXAMPLE SENSOR FAILURE, CONNECTION DAMAGE).
- OBSTRUCTIONS IN THE SUCTION LINE.

IN ADDITION, THE NEWLY PROPOSED CONFIGURATION WILL INCREASE THE PERFORMANCE OF THE COMPRESSOR IN TERMS OF CAPACITY, BECAUSE BY INCREASING THE INLET PRESSURE, THE NOMINAL FLOW DISCHARGE WILL ALSO INCREASE.

THE IMPROVEMENT IS INTENDED FOR EXISTING EQUIPMENT AND CAN BE PROPOSED IN TWO DIFFERENT MANNERS:

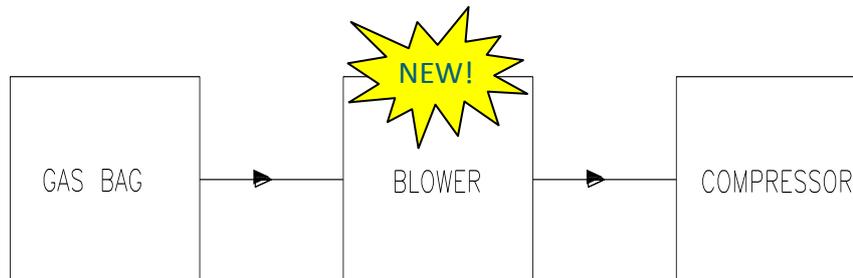
1. SUPPLY OF THE MAIN ITEMS AND ARRANGEMENT DESCRIPTION.  
(INSTALLATION NOT DRASS SCOPE OF SUPPLY)
2. VISIT ON BOARD TO CHECK THE STATUS OF THE EQUIPMENT INSTALLED, DETAILED INSTALLATION ENGINEERING INCLUDING SUPPLY OF MATERIALS TO APPLY THE PROCEDURE.

IN THE FIRST CASE DRASS WILL FURNISH MAIN ITEMS AND A GUIDELINE FOR THE MODIFICATION REGARDLESS OF THE SPECIFIC INSTALLATION.

IN THE SECOND, IT IS NECESSARY TO EVALUATE EACH CASE IN ORDER TO DEVELOP DETAILED ENGINEERING WITH ALL THE MATERIAL NEEDED FOR MODIFICATIONS.

### DESCRIPTION

THE MAIN MODIFICATION CONSISTS OF THE INSERTION OF A BLOWER BOOSTER IN THE COMPRESSOR SUCTION LINE AT THE GAS BAG OUTLET

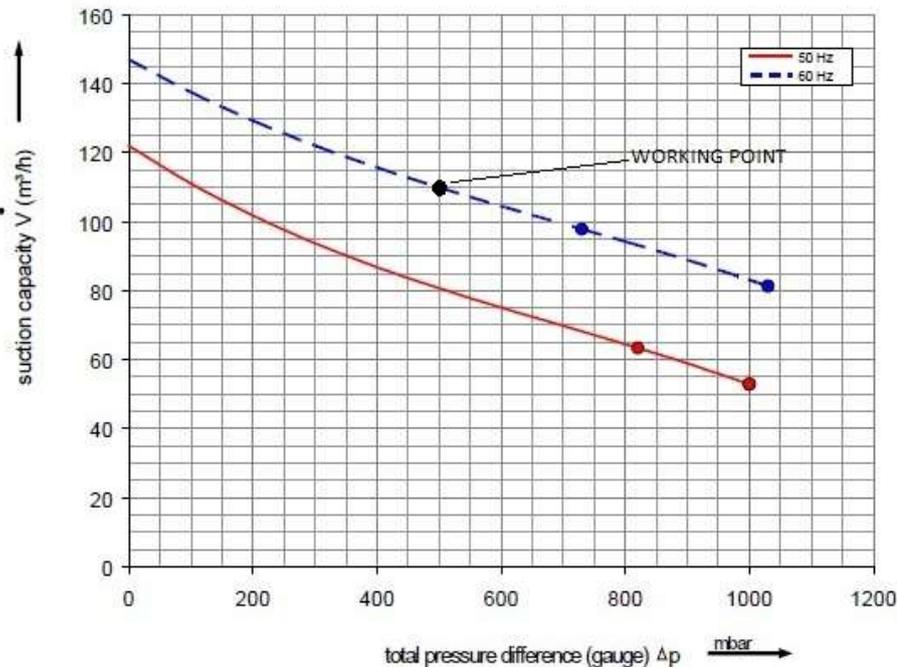


THE BLOWER STARTS/STOPS SIMULTANEOUSLY WITH THE COMPRESSOR FROM ITS CONTROL PANEL. (COMPRESSOR PANEL SHALL BE MODIFIED).



(FOR REFERENCE ONLY)

### BLOWER PERFORMANCE CURVE



AT THE COMPRESSOR'S NORMAL FLOW (APPROX. 110M<sup>3</sup>/H) THE BLOWER CAN PRODUCE A  $\Delta P = 500$  MBAR, THEREBY INCREASING THE VALUE OF THE COMPRESSOR'S INLET PRESSURE.

COMPRESSOR SUCTION PRESSURE VALUES ARE AS FOLLOWS:

- MINIMUM FOR SAFE OPERATION = - 20 MBAR
- MINIMUM FOR CORRECT OPERATION = -20 ÷ 20 MBAR  
(RECOMMENDED)
- MAXIMUM = 2 BAR

THE DISCHARGE PRESSURE OF THE BLOWER IS HOWEVER LOWER THAN THE COMPRESSOR'S MAXIMUM SUCTION PRESSURE.

THE INSERTION OF THE BLOWER PREVENTS THE COMPRESSOR FROM WORKING IN VACUUM AND MORE IMPORTANTLY, INCREASES FLOW CAPACITY.

IF THE BOOSTER AND THE COMPRESSOR ARE CONNECTED WITH A 1.1/4" LINE ( $\varnothing$  32MM), IN THE ABOVE WORKING CONDITIONS, THE PRESSURE DROP OF THE LINE IS 200MBAR EVERY 100MT. AS A CONSEQUENCE, THE MAXIMUM

DISTANCE BETWEEN THE BLOWER AND THE COMPRESSOR FOR CORRECT OPERATION CAN REACH 250M (EQUIVALENT DISTANCE, I.E. WITHOUT CURVES AND NARROWING). THIS ALSO ALLOWS THE GAS BAG TO BE POSITIONED FURTHER FROM THE COMPRESSOR, IN THE CASE THAT THIS IS REQUIRED. LONGER DISTANCES CAN BE REACHED, INCREASING THE SIZE OF THE LINE.

IN ADDITION TO THIS IMPROVEMENT, A GENERAL CHECK OF THE COMPRESSOR'S INSTRUMENTATION AND CONTROL SYSTEM IT IS MANDATORY IN ORDER TO GUARANTEE SAFETY IN THE OCCURRENCE OF AN UNEXPECTED LOW INLET PRESSURE. INDEED, MANY DISCREPANCIES AND INACCURACIES HAVE BEEN HIGHLIGHTED IN COMPAIR'S INSTRUMENT INSTALLATION AND DOCUMENTATION.

FOR EXAMPLE, DRASS NOTED THE WRONG INSTALLATION OF THE SAFETY VACUUM SWITCH ITEM BECK PRESCAL 901.71 INSTALLED ON COMPAIR 5437 COMPRESSORS, ON THE SUCTION SIDE.



THE SWITCH SHOULD BE INSTALLED ON TERMINALS 3-2, NORMALLY CLOSED, INSTEAD OF BEING INSTALLED ON 3-2 NORMALLY OPEN. ACCORDING TO THE FOLLOWING DATASHEET, IN ORDER TO AVOID AN INCORRECT WORKING STATUS WHEN THE PRESSURE FALLS UNDER -20 MBAR.



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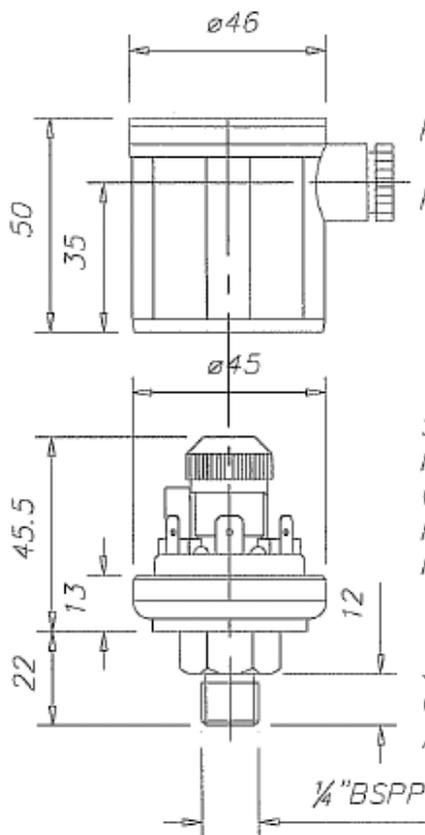
ISSUE DATE 12/08/2002

LAST MOD No. .

TECHNICAL SPECIFICATION

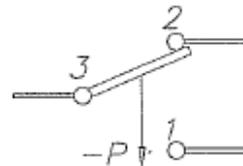
DESCRIPTION VACUUM SWITCH -5 TO -20 mBAR

COMPUTER GENERATED DRAWING - DO NOT ALTER MANUALLY



PROTECTION CAP TYPE 6372  
 PROTECTION IP 65

SWITCH TYPE 901.71  
 RANGE -5 TO -20mBAR  
 OVER PRESSURE 500 mBAR  
 PROCESS CONNECTION 1/4" BSPP  
 MATERIALS  
 BODY CuZn40(SW21)  
 DIAPHRAGM NITRILE  
 SWITCH RATING 6(1.5)A/250VAC  
 CONTACTS 1 N.O - 1 N.C  
 AMBIENT TEMPERATURE -20 TO 85°C



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		REVISIONS REVISED J.S.Cook APPROVED K.Thurlow	12/08/2002 12/08/2002
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WHEN CHECKED WITH A METER THE SWITCH CONNECTIONS SHOULD BE 'CLOSED' UNLESS A VACUUM IS APPLIED OPENING THE CONTACTS. THIS CAN BE FOUND IN THE WIRING SCHEMATICS PROVIDED WITH COMPRESSOR MANUALS.

TO ENSURE GOOD OPERATION, THE CONTROL LOGIC INSIDE THE PANEL OF THE COMPRESSOR SHALL BE MODIFIED IN ORDER TO MATCH THE CORRECT SWITCH SETTINGS AND THEREFORE TO GUARANTEE THE COMPRESSOR'S SAFE STOPPING FUNCTION.

#### ALTERNATIVE SOLUTIONS

IT IS POSSIBLE TO REPLACE THE SUCTION PIPE, INCREASING THE CROSS SECTION WITH A 4" PIPE. IN THIS WAY THE PROBLEM IS SOLVED, HOWEVER IT REDUCES THE OVERALL PERFORMANCE OF THE COMPRESSOR. SEE COMPRESSOR'S DATA SHEET ON YOUR MANUAL.

IMPROVEMENT KITS CAN BE REQUESTED FROM [CLAUDIA.RAMIREZ@DRASS.IT](mailto:CLAUDIA.RAMIREZ@DRASS.IT); WITH [SALES@DRASS.IT](mailto:SALES@DRASS.IT) IN C.C. WITH REFERENCE TO "TECHNICAL BULLETIN FD40 - 00XX.

REMEMBER THAT THE FOLLOWING KITS ARE AVAILABLE:

1. SUPPLY OF THE MAIN ITEMS AND ARRANGEMENT DESCRIPTION.  
(INSTALLATION NOT DRASS SCOPE OF SUPPLY)
2. VISIT ON BOARD TO CHECK THE STATUS OF THE EQUIPMENT INSTALLED, DETAILED INSTALLATION ENGINEERING INCLUDING SUPPLY OF MATERIALS TO APPLY THE PROCEDURE.



### APPLICABILITY

THE “COMPAIR COMPRESSORS SAFETY IMPROVEMENT” IS APPLICABLE TO ALL DIVING SYSTEMS WHICH EMPLOY A HELIOX COMPAIR COMPRESSORS AND GAS BAG, REGARDLESS THE EQUIPMENT WAS FURNISHED BY DRASS.

### RECOMMENDATIONS

1. USE ONLY DRASS ORIGINAL UPGRADE KIT
2. RECORD THE MODIFICATIONS IN THE DOCUMENTATION OF THE DIVING SYSTEM
3. REPORT THE EXECUTION OF THE IMPROVEMENT AS PER OEM RECOMMENDATIONS TO THE CLASS SURVEYOR DURING THE ANNUAL SURVEY.