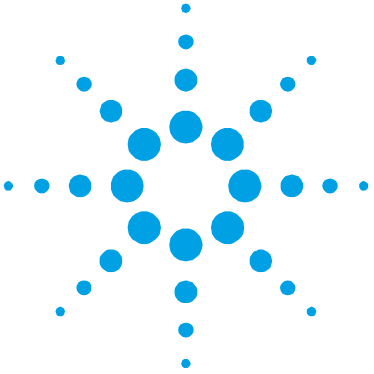

# TwisTorr 305 FS Remote Controller

**Models**
**X3506-64130, X3506-64131**

**Manuale di istruzioni**
**Bedienungshandbuch**
**Notice de mode d'emploi**
**Manual de istrucciones**
**用户手册**
**ユーザーマニュアル**
**User Manual**

**87-901-059-01**
**01/2020**

**Agilent Technologies**

# Notices



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**WARNING**

**A WARNING notice denotes a hazard. It calls attention to an operating procedure, practice, or the like that, if not correctly performed or adhered to, could result in personal injury or death. Do not proceed beyond a WARNING notice until the indicated conditions are fully understood and met.**

# TwisTorr 305 FS Remote Controller

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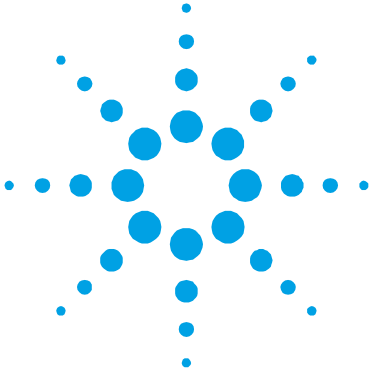

# 1 Istruzioni per l'uso


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Traduzione delle istruzioni originali

# Informazioni Generali

Questa apparecchiatura è destinata ad uso professionale. L'utilizzatore deve leggere attentamente il presente manuale di istruzioni ed ogni altra informazione addizionale fornita dalla Agilent prima dell'utilizzo dell'apparecchiatura. La Agilent si ritiene sollevata da eventuali responsabilità dovute all'inosservanza totale o parziale delle istruzioni, ad uso improprio da parte di personale non addestrato, ad interventi non autorizzati o ad uso contrario alle normative nazionali specifiche. I controller della serie TwisTorr 305 FS Remote sono dei convertitori di frequenza, controllati da un microprocessore, realizzati con componenti a stato solido e con capacità di autodiagnostica e autoprotezione.

Caratteristiche del controller:

- Operatività frontale / remota / seriale
- Pilotaggio a 24 Vdc della ventola di raffreddamento pompa
- Pilotaggio vent valve
- Lettura velocità pompa in seguito al commando di arresto (lettura velocità di arresto)
- Lettura della pressione
- Interfaccia Profibus (opzionale)
- Impostazione automatica tensione di ingresso.

Nei paragrafi seguenti sono riportate tutte le informazioni necessarie a garantire la sicurezza dell'operatore durante l'utilizzo dell'apparecchiatura. Informazioni dettagliate sono fornite nell'appendice "Technical Information".

**Questo manuale utilizza le seguenti convenzioni:**

**AVVERTENZA!**

**I messaggi di avvertenza attirano l'attenzione dell'operatore su una procedura o una pratica specifica che, se non eseguita in modo corretto, potrebbe provocare gravi lesioni personali.**

**ATTENZIONE!** I messaggi di attenzione sono visualizzati prima di procedure che, se non osservate, potrebbero causare danni all'apparecchiatura.

**NOTA** Le note contengono informazioni importanti estrapolate dal testo.

# Immagazzinamento

Durante il trasporto e l'immagazzinamento dei controller devono essere soddisfatte le seguenti condizioni ambientali:

- temperatura: da -20 °C a +70 °C
- umidità relativa: 0 – 95 % (non condensante)

# Preparazione per l'installazione

Il controller viene fornito in un imballo protettivo speciale; se si presentano segni di danni, che potrebbero essersi verificati durante il trasporto, contattare l'ufficio vendite locale.

Durante l'operazione di disimballaggio, prestare particolare attenzione a non lasciar cadere il controller e a non sottoporlo ad urti.

Non disperdere l'imballo nell'ambiente. Il materiale è completamente riciclabile e risponde alla direttiva CEE 85/399 per la tutela dell'ambiente.

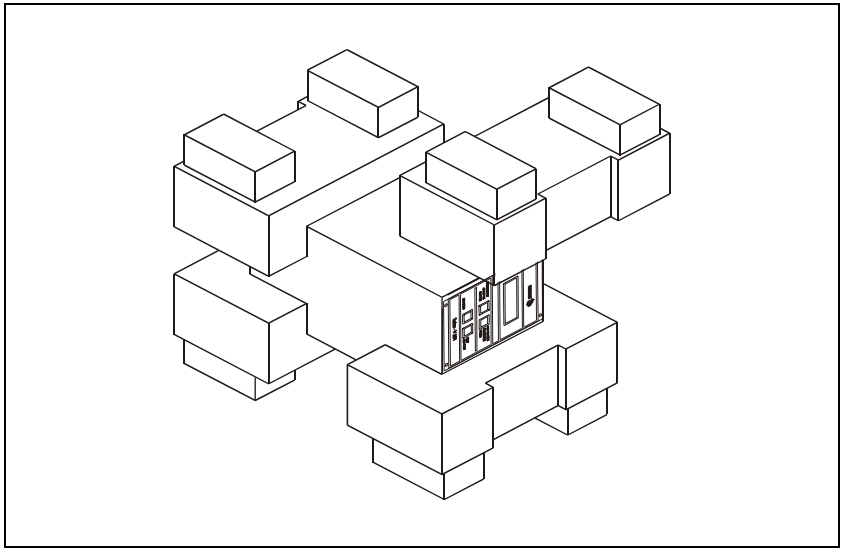


**Figura 1** Imballo dei controller

# Installazione

**AVVERTENZA!**

**Il controller è progettato solo per uso interno e deve essere alimentato mediante un cavo di alimentazione a tre fili (vedere tabella delle parti ordinabili) con una spina di tipo approvato a livello internazionale ai fini della sicurezza dell'utente. Utilizzare sempre questo cavo di alimentazione ed inserire la spina in una presa con un adeguato collegamento di terra onde evitare scariche elettriche e per rispettare le specifiche CE. All'interno del controller si sviluppano alte tensioni che possono recare gravi danni o la morte. Prima di eseguire qualsiasi operazione di installazione o manutenzione del controller scollegarlo dalla presa di alimentazione.**

**NOTA**

Il controller può essere installato su di un tavolo o all'interno di un apposito rack. In ogni caso occorre che l'aria di raffreddamento possa circolare liberamente intorno all'apparato. Non installare né utilizzare il controller in ambienti esposti ad agenti atmosferici (pioggia, gelo, neve), polveri, gas aggressivi, in ambienti esplosivi o con elevato rischio di incendio.

Durante il funzionamento è necessario che siano rispettate le seguenti condizioni ambientali:

- temperatura: da 5 °C a +45 °C;
- umidità relativa: 0 – 95 % (non condensante).

Per gli altri collegamenti e l'installazione degli accessori opzionali, vedere la sezione "Technical Information".

# Uso

In questo paragrafo sono riportate le principali procedure operative. Per ulteriori dettagli e per procedure che coinvolgono collegamenti o particolari opzionali, fare riferimento al paragrafo "Use" dell'appendice "Technical Information".

Prima di usare il controller effettuare tutti i collegamenti elettrici e pneumatici e fare riferimento al manuale della pompa collegata.

**AVVERTENZA!**

**Per evitare danni alle persone ed all'apparato, nel caso in cui la pompa sia appoggiata su di un tavolo assicurarsi che sia stabile. Non fare funzionare mai la pompa se la flangia di ingresso non è collegata al sistema o non è chiusa con la flangia di chiusura.**

**NOTA** Il connettore di richiusura J1 deve essere lasciato collegato con il suo ponticello se non viene effettuato alcun collegamento esterno. La pompa di pre-vuoto e la pompa TwisTorr 305 FS possono essere accese contemporaneamente.

# Comandi, Indicatori e Connettori

Di seguito sono illustrati il pannello di comando del Controller ed i pannelli di interconnessione. Per maggiori dettagli fare riferimento alla sezione "Technical Information".

# Descrizione pannello frontale

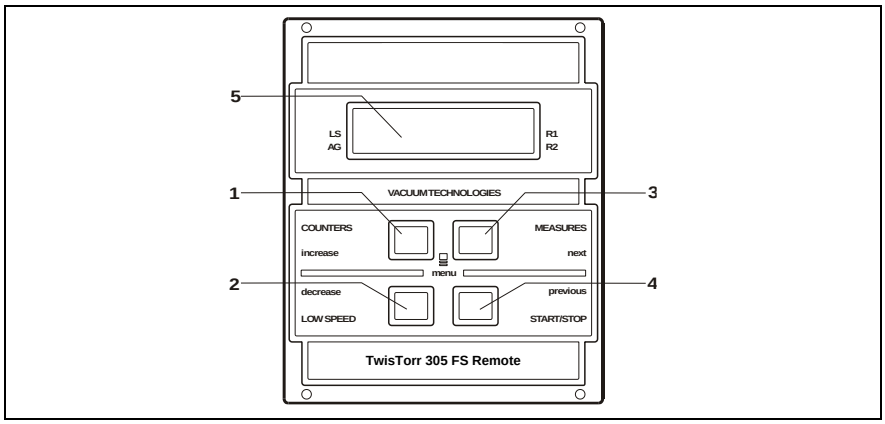



**Figura 2** Pannello frontale del Controller TwisTorr 305 FS Remote

| | |
|---|---|
| 1 | Pulsante per richiamare sul display i parametri cycle number, cycle time e pump life. |
| 2 | Pulsante per la selezione del modo LOW SPEED. È attivo solo quando è selezionato il modo di comando dal pannello frontale. Premendolo una volta, la pompa ruota a velocità "stand-by". Premendolo ancora si disattiva il modo LOW SPEED. |
| 3 | Pulsante per richiamare sul display i parametri pump current, pump temperature, pump power e rotational speed. È sempre attivo indipendentemente dal modo di funzionamento scelto. Premendo assieme i pulsanti 3 e 1 per almeno 2 secondi viene attivato un programma con il quale è possibile programmare alcuni parametri operativi. |
| 4 | Pulsante per inviare i comandi di START, STOP/RESET. È attivo solo quando è selezionato il modo di comando dal pannello frontale. Premendolo una volta si attiva la fase di avvio; premendolo nuovamente si arresta la pompa. Se la pompa si è fermata automaticamente a causa di un guasto, occorre premere questo pulsante una prima volta per eseguire il reset del controller ed una seconda volta per riavviare la pompa. |
| 5 | Display alfanumerico a cristalli liquidi: matrice di punti, 2 linee x 16 caratteri. |

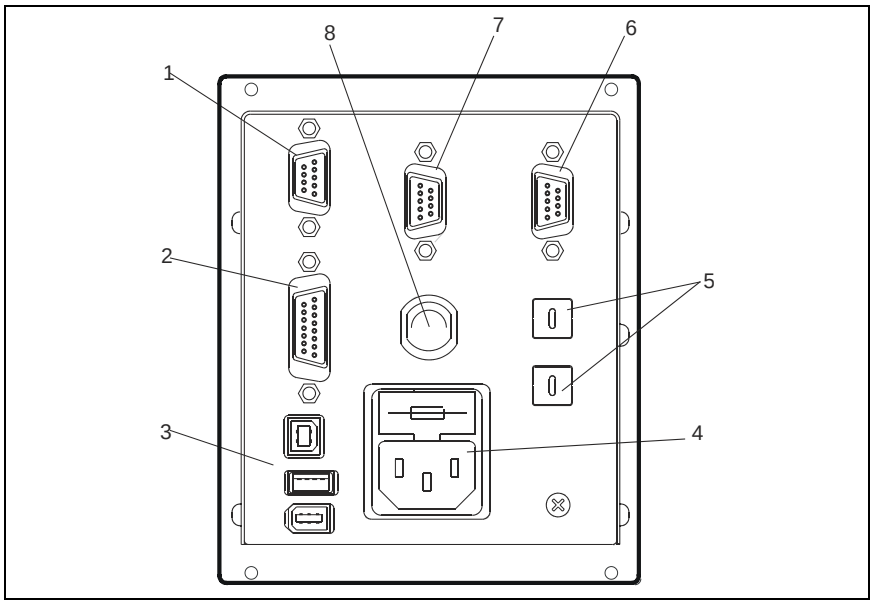



**Figura 3** Pannello posteriore dei Controller TwisTorr 305 FS Remote

| | |
|---|---|
| 1 | Connettore di ingresso dei segnali logici (il connettore di accoppiamento viene fornito con l'apposito ponticello di richiusura). |
| 2 | Connettore segnali logici in uscita e monitoraggio frequenza pompa più uscita analogica programmabile. |
| 3 | Connettore di uscita alimentazione (24 Vdc per la ventola di raffreddamento pompa, vent valve e calibro). |
| 4 | Modulo di ingresso alimentazione controller che comprende i fusibili, la presa di alimentazione ed il filtro ENC. |
| 5 | Switch a rotazione per impostare l'indirizzo del Profibus. |
| 6 | Profibus (opzionale). |
| 7 | Connettore seriale per controllo da remoto. |
| 8 | Pompa. |

# Procedure di uso

## Accensione del Controller

Per accendere il controller è sufficiente inserire il cavo di alimentazione nella presa di rete.

## Avvio della Pompa

Per avviare la pompa occorre abilitare l'ingresso di interlock e premere il pulsante START del pannello frontale.

## Arresto della Pompa

Per arrestare la pompa occorre premere il pulsante STOP del pannello frontale.

# Manutenzione

I controller della serie TwisTorr 305 FS Remote non richiedono alcuna manutenzione. Qualsiasi intervento deve essere eseguito da personale autorizzato. In caso di guasto è possibile usufruire del servizio di riparazione Agilent o del "Agilent advanced exchange service", che permette di ottenere un controller rigenerato in sostituzione di quello guasto.

---

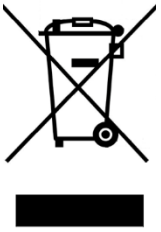
**AVVERTENZA!** **Prima di effettuare qualsiasi intervento sul controller scollegare il cavo di alimentazione.**

---

Qualora un controller dovesse essere rottamato, procedere alla sua eliminazione nel rispetto delle normative nazionali specifiche.

# Smaltimento

**Significato del logo "WEEE" presente sulle etichette.** Il simbolo qui sotto riportato è applicato in ottemperanza alla direttiva CE denominata "WEEE". Questo simbolo (**valido solo per i paesi della Comunità Europea**) indica che il prodotto sul quale è applicato, NON deve essere smaltito insieme ai comuni rifiuti domestici o industriali, ma deve essere avviato ad un sistema di raccolta differenziata. Si invita pertanto l'utente finale a contattare il fornitore del dispositivo, sia esso la casa madre o un rivenditore, per avviare il processo di raccolta e smaltimento, dopo opportuna verifica dei termini e condizioni contrattuali di vendita.



Per maggiori informazioni riferirsi a:

http://www.agilent.com/environment/product/index.shtml

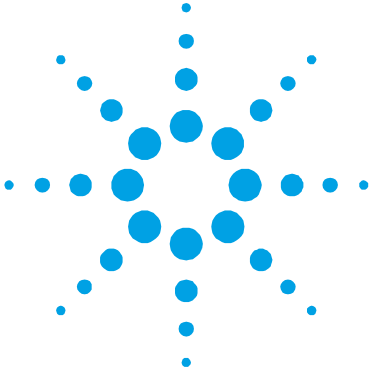
# Messaggi di errore

In alcuni casi di guasto la circuiteria di autodiagnosi del controller presenta alcuni messaggi di errore elencati nella tabella seguente.

**Tab. 1**

| MESSAGGIO | DESCRIZIONE | AZIONE CORRETTIVA |
|---|---|---|
| **RUN UP TIME** | La pompa non è riuscita a raggiungere una velocità> 700 Hz, entro il tempo previsto (Tempo di avvio, che è configurabile). | Verificare l'impostazione del tempo di avvio: deve essere impostato in base al processo del cliente.<br>Controllare il carico di gas che scorre all'interno della pompa e regolarlo di conseguenza.<br>Verificare che il rotore della pompa possa ruotare liberamente.<br>Riavviare la pompa. |
| **CHECK CONNECTION TO PUMP** | Malfunzionamento nel collegamento tra pompa e controller.<br>Oppure<br>La pompa ha una temperatura inferiore a 0 °C. | Verificare che il cavo di collegamento tra pompa e controller sia ben fissato da entrambe le estremità e non sia interrotto. Premere due volte il pulsante START per riavviare la pompa. |
| **WAITING INTERLOCK** | È attivo il segnale di interlock presente sul connettore P1 a causa dell'interruzione del corto circuito tra il pin 3 ed il pin 8 del connettore J1, o a causa dell'apertura del segnale di interlock esterno. | Ripristinare il corto circuito tra il pin 3 ed il pin8 del connettore P1, o chiudere il segnale di interlock esterno. |
| **PUMP OVERTEMP.** | La temperatura del corpo pompa ha superato il limite superiore di temperatura consentito, che è in funzione del tipo di gas selezionato (Ar: 50°C; N2: 55°C; He: 60°C). | Attendere che la temperatura ritorni al di sotto della soglia. Premere due volte il pulsante START per riavviare la pompa. |
| **CONTROLLER OVERTEMP.** | La temperatura dell'ambiente del controller ha superato i 70 °C.<br>Oppure.<br>La temperatura del radiatore del controller è superiore a 60 °C. | Attendere che la temperatura ritorni al di sotto della soglia. Premere due volte il pulsante START per riavviare la pompa. |

| MESSAGGIO | DESCRIZIONE | AZIONE CORRETTIVA |
|---|---|---|
| **TOO HIGH LOAD** | La corrente assorbita dalla pompa è maggiore di quella programmata. | Verificare che il rotore della pompa abbia la possibilità di ruotare liberamente. Premere due volte il pulsante START per riavviare la pompa. |
| **SHORT CIRCUIT** | Durante il funzionamento normale (dopo la fase di avvio) la connessione di uscita è in corto circuito. | Verificare i collegamenti tra pompa e controller. Premere due volte il pulsante START per riavviare la pompa. |
| **SYSTEM OVERRIDE** | La pompa è stata fermata da un segnale di emergenza proveniente da un contatto remoto. | Staccare il cavo di alimentazione del controller e correggere la causa dell'emergenza. Ricollegare il cavo di alimentazione e premere due volte il pulsante START per riavviare la pompa. |
| **OVERVOLTAGE** | Si è verificato un guasto nella sezione di alimentazione del controller, o il controller ha ricevuto un segnale spurio. | Premere due volte il pulsante START per riavviare la pompa. Se il messaggio si ripresenta rivolgersi in Agilent per la manutenzione. |
| **RUN UP TIME** | Tempo di Run Up scaduto. | Verificare la corretta impostazione del tempo di Run Up in funzione dell'applicazione. Verificare il carico di gas applicato alla pompa. |



# 2 Gebrauchsanleitung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Übersetzung der Originalanleitungen

# Allgemeines

Dieser Apparat ist für Fachbetriebe bestimmt. Vor Gebrauch sollte der Benutzer dieses Handbuch sowie alle weiteren mitgelieferten Zusatzdokumentationen genau lesen. Bei Nichtbeachtung - auch teilweise - der enthaltenen Hinweise, unsachgemäßem Gebrauch durch ungeschultes Personal, nicht autorisierten Eingriffen und Mißachtung der einheimischen, hier zur Geltung kommenden Bestimmungen übernimmt die Firma Agilent keinerlei Haftung.

Die Controller der Serie TwisTorr 305 FS Remote sind mikroprozessorgesteuerte Frequenzwandler. Sie sind mit Festkörperbauteilen gefertigt und verfügen über ein Selbstdiagnose- und ein Selbstschutzsystem.

Controllereigenschaften:

- Konsol-, Fern- und serielle Operationen
- 24V= Kühlventilator-Treiber
- Vent Valve Treiber
- Auslesen der Pumpgeschwindigkeit nach Stoppbefehl (Lesen der Stoppgeschwindigkeit)
- Auslesen des Drucks
- Profibus-Schnittstelle (Option)
- automatische Einstellung der Eingangsspannung

In den folgenden Abschnitten sind alle erforderlichen Informationen für die Sicherheit des Bedieners bei der Anwendung des Geräts aufgeführt. Detaillierte technische Informationen sind im Anhang "Technical Information" enthalten.

**In dieser Gebrauchsanleitung werden Sicherheitshinweise folgendermaßen hervorgehoben:**

**WARNUNG!**

**Die Warnhinweise lenken die Aufmerksamkeit des Bedieners auf eine bestimmte Prozedur oder Praktik, die bei unkorrekter Ausführung schwere Verletzungen hervorrufen können.**

**VORSICHT!** Die Vorsichtshinweise vor bestimmten Prozeduren machen den Bediener darauf aufmerksam, daß bei Nichteinhaltung Schäden an der Anlage entstehen können.

**HINWEIS** Die Hinweise enthalten wichtige Informationen, die aus dem Text hervorgehoben werden.

# Lagerung

Beim Transport und bei der Lagerung der Controller müssen folgende klimatische Verhältnisse eingehalten werden:

- Temperatur: von -20 °C bis +70 °C
- Relative Luftfeuchtigkeit: 0 – 95 % (nicht kondensierend)

# Vor der Installation

Der Controller wird mit einer speziellen Schutzverpackung geliefert. Eventuelle Transportschäden müssen der zuständigen örtlichen Verkaufsstelle gemeldet werden.

Beim Auspacken vorsichtig vorgehen, damit der Controller nicht fällt oder Stößen ausgesetzt wird.

Das Verpackungsmaterial muß korrekt entsorgt werden. Es ist vollständig recyclebar und entspricht der EG-Richtlinie 85/399 für Umweltschutz.

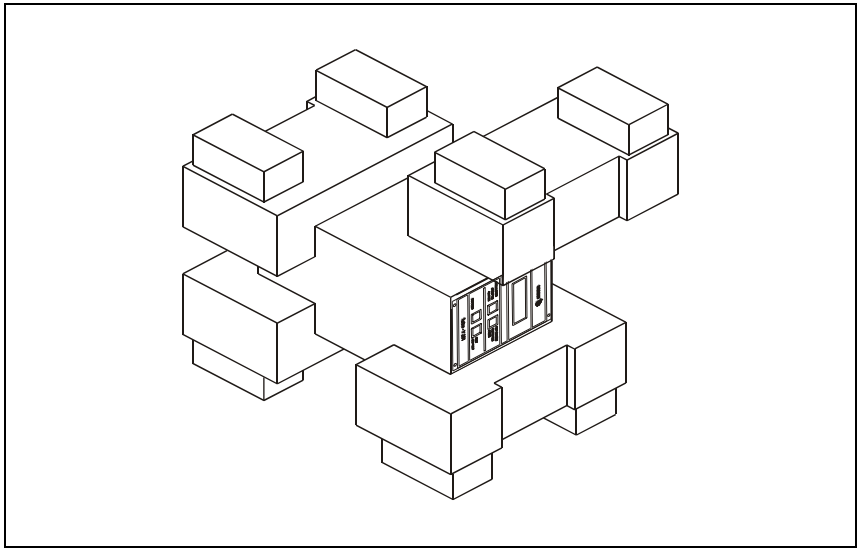


**Abbildung 1** Verpackung der Controller

# Installation

**WARNUNG!**

**Zum Schutz des Bedieners darf der Controller nur im Gebäude zum Einsatz kommen und nicht außerhalb. Er muss mit einem dreiadrigen Netzkabel (siehe Tabelle bestellbares Zubehör) und dem (international zugelassenen) Stecker angeschlossen werden. Es sollte immer dieses Netzkabel benutzt werden, das an eine korrekt geerdete Steckdose anzuschließen ist, um den CE Richtlinien zu entsprechen und Stromschläge zu vermeiden. Im Inneren des Controllers entstehen hohe Spannungen, die schwere Schäden verursachen und zum Teil lebensgefährlich sein können. Vor jedem Montage- bzw. Wartungseingriff muß deshalb der Netzstecker gezogen werden.**

**HINWEIS**

Der Controller kann auf einen Tisch oder ein Gestell montiert werden. In beiden Fällen muß auf die ungehinderte Zirkulation der Kühlluft im Bereich des Geräts geachtet werden. Der Controller darf nicht in Umgebungen installiert u/o benutzt werden, die Witterungseinflüssen (Regen, Frost, Schnee), Staub und aggressiven Gasen ausgesetzt sind und in denen Explosions- und erhöhte Brandgefahr besteht.

Beim Betrieb müssen folgende Umgebungsbedingungen eingehalten werden:

- Temperatur: von +5 °C bis +45 °C
- Relative Luftfeuchtigkeit: 0 – 95 % (nicht kondensierend).

# Gebrauch

In diesem Kapitel sind die wichtigsten Betriebsvorgänge aufgeführt. Für weitere Hinweise bezüglich Anschlüsse und Montage des bestellbaren Zubehörs siehe Kapitel "Use" im Anhang zu "Technical Information".

Vor Benutzung des Controllers sämtliche elektrischen und pneumatischen Anschlüsse ausführen, und die Betriebsanleitung der angeschlossenen Pumpe durchlesen.

**WARNUNG!**

**Steht die Pumpe auf einem Tisch, muß auf den stabilen Stand geachtet werden, da sonst die Gefahr von Personen- und Geräteschäden besteht. Die Pumpe nie einschalten, wenn der Eingangsflansch nicht am System angeschlossen bzw. nicht mit dem Schließflansch abgedeckt ist.**

**HINWEIS**

Der Wiederverschließ-Verbinder J1 muß mit seiner Brücke angeschlossen bleiben, wenn kein externer Anschluß erfolgt. Die Vorvakuumpumpe und die TwisTorr 305 FS Pumpe können gleichzeitig eingeschaltet werden.

# Steuerungen, Anzeigen und Verbinder des Controllers

Der folgende Abschnitt beschreibt die vordere und hintere Konsole des Controllers. Fur weitere Einzelheiten siehe „Technical Information“.

# Fronttafel der Controller

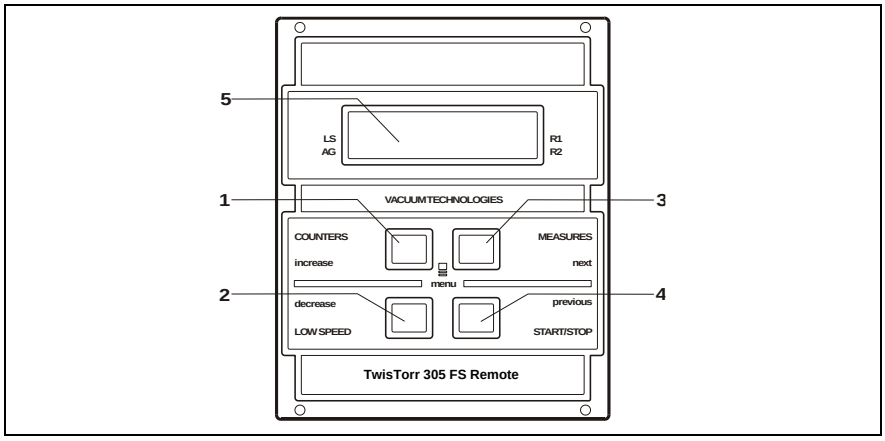



**Abbildung 2** Fronttafel der Controller TwisTorr 305 FS Remote

| | |
|---|---|
| 1 | Taste für die Anzeige der Parameter "cycle number", "cycle time" und "pump life". |
| 2 | Taste für die Einstellung des Modus LOW SPEED. Sie ist nur aktiv, wenn der Steuermodus auf Fronttafel eingestellt ist. Bei einmaligem Drücken läuft die Pumpe in Bereitschafts-Geschwindigkeit. Bei nochmaligem Drücken wird der Modus LOW SPEED deaktiviert. |
| 3 | Taste für die Anzeige der Parameter "pump current", "pump temperature", "pump power" und "rational speed". Sie ist immer aktiv, unabhängig vom gewählten Betriebsmodus. Bei gemeinsamer, mindestens 2 Sekunden langer Betätigung der Tasten 3 und 1 wird ein Programm aktiviert, mit dem einige Betriebsparamter programmiert werden können. |
| 4 | START-, STOP/RESET-Taste. Sie ist nur aktiv, wenn der Steuermodus auf der Fronttafel eingestellt ist. Bei einmaligem Drücken wird die Startphase aktiviert. Bei nochmaligem Drücken stoppt die Pumpe. Bei automatischem Pumpenstopp durch Störung muß diese Taste ein erstes Mal zur Controller-Rücksetzung und dann ein zweites Mal zum Neustarten der Pumpe gedrückt werden. |
| 5 | Alphanumerisches Flüssigkristall-Display: Punkt-matrix, 2 Zeilen mit 16 Stellen. |

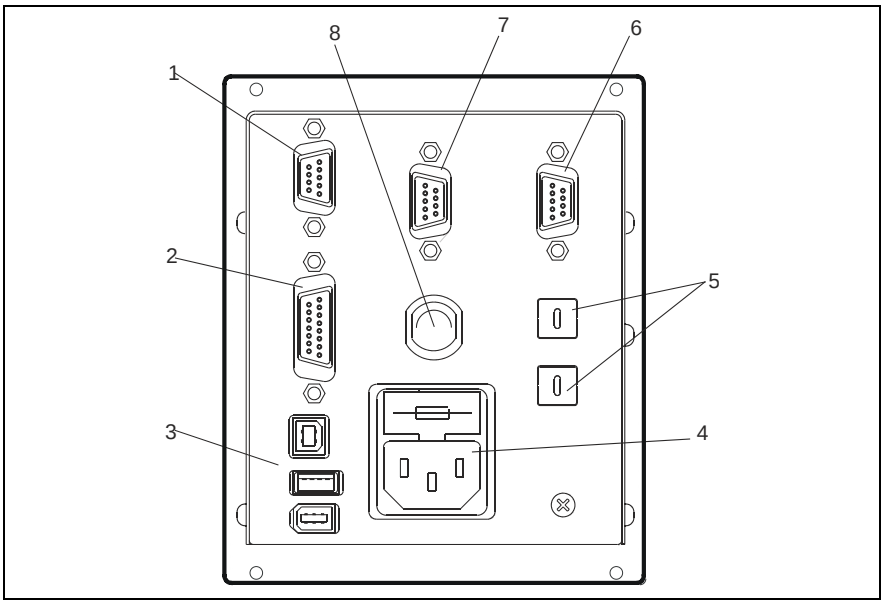



**Abbildung 3** Rücktafel der Controller TwisTorr 305 FS Remote

| | |
|---|---|
| 1 | Eingangsverbinder der logischen Signale (der Kupplungsverbinder wird mit einer Wiederverschließbrücke geliefert). |
| 2 | Stecker für logische Signale und Pumpenmonitor plus programmierbarer Analogausgang. |
| 3 | Stromausgangsstecker (24 V= für Pumpenkühlventilator, Vent Valve und Messinstrument). |
| 4 | Netzeingangsmodul des Controllers bestehend aus Netzsicherungen, Netzstecker und EMC Filter. |
| 5 | Drehschalter zum Setzen der Profibus Adresse. |
| 6 | Profibus (Option). |
| 7 | Serieller Stecker zur Fernsteuerung. |
| 8 | Pumpenstecker. |

# Bedienung

## Einschalten des Controllers

Zum Einschalten des Controllers genügt es, das Netzkabel an die Steckdose anzuschließen.

## Pumpenstart

Zum Starten der Pumpe den Verrieglungseingang bestätigen und die START Taste of der vorderen Konsole des Controllers drücken.

## Pumpenstopp

Zum Stoppen der Pumpe muß die STOP-Taste an der Fronttafel gedrückt werden.

# Wartung

Die Controller der Serie TwisTorr 305 FS Remote sind wartungsfrei. Eventuell erforderliche Eingriffe müssen von dazu befugtem Fachpersonal ausgeführt werden. Bei einem Defekt kann der Agilent-Reparaturdienst bzw. der "Agilent advanced exchange service" in Anspruch genommen werden, der für die Erneuerung defekter Controller sorgt.

---

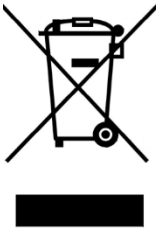
**WARNUNG!** **Vor jedem Eingriff am Controller muß der Netzstecker gezogen werden.**

---

Ein Controller muß unter Einhaltung der einschlägigen landesüblichen Vorschriften erfolgen.

# Entsorgung

**Bedeutung des "WEEE" Logos auf den Etiketten.** Das folgende Symbol ist in Übereinstimmung mit der EU-Richtlinie WEEE (Waste Electrical and Electronic Equipment) angebracht. Dieses Symbol (**nur in den EU-Ländern gültig**) zeigt an, dass das betreffende Produkt nicht zusammen mit Haushaltsmüll entsorgt werden darf sondern einem speziellen Sammelsystem zugeführt werden muss. Der Endabnehmer sollte daher den Lieferanten des Geräts - d.h. die Muttergesellschaft oder den Wiederverkäufer - kontaktieren, um den Entsorgungsprozess zu starten, nachdem er die Verkaufsbedingungen geprüft hat.



Weitere Informationen finden Sie unter:

http://www.agilent.com/environment/product/index.shtml

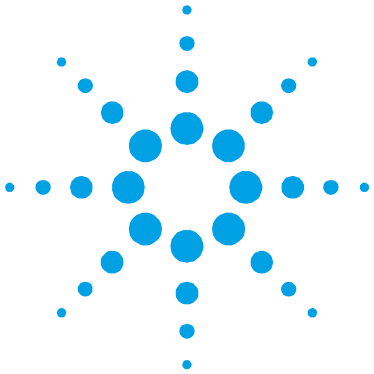
# Fehlermeldungen

In einigen Störungsfällen zeigt das Selbstdiagnosesystem des Controllers die in der nachstehenden Tabelle zusammengefaßten Meldungen an.

**Tab. 1**

| MELDUNG | BESCHREIBUNG | BEHEBUNG |
|---|---|---|
| **RUN UP TIME** | Die Pumpe konnte innerhalb des erwarteten Wertes (konfigurierbare Anlaufzeit) keinen Drehzahlwert > 700 Hz erreichen. | Prüfen Sie, ob die Anlaufzeit eingestellt ist: Sie sollte entsprechend dem Kundenprozess eingestellt sein. Überprüfen Sie die in der Pumpe strömende Gaslast und stellen Sie sie entsprechend ein. Überprüfen Sie, ob sich der Pumpenrotor frei drehen kann. Starten Sie die Pumpe neu. |
| **CHECK CONNECTION TO PUMP** | Fehlfunktion der Pumpen-Controller Verbindung. Oder Die Temperatur der Pumpe ist unter 0 °C. | Sicherstellen, daß das Verbindungskabel zwischen Pumpe und Controller an beiden Seiten korrekt befestigt ist und keine Unterbrechung vorliegt. Die Pumpe durch zweimalige Betätigung der START-Taste neustarten. |
| **WAITING INTERLOCK** | Das Interlock-Signal auf dem Verbinder P1 ist wegen der Kurzschluß-unterbrechung zwischen Pin 3 und Pin 8 des Verbinders K1 oder wegen der Öffnung des externen Interlock-Signals aktiv. | Den Kurzschluß zwischen Pin 3 und Pin 8 des Verbinders P1 rücksetzen oder das externe Interlock-Signal schließen. |
| **PUMP OVERTEMP.** | Die Temperatur des Pumpenkörpers hat die maximal zulässige Obergrenze überschritten, abhängig von der gewählten Gasart (Ar: 50°C; N2: 55°C; He: 60°C). | Warten bis die Temperatur unter den Schwellenwert gesunken ist. Die Pumpe durch zweimalige Betätigung der START-Taste neustarten. |
| **CONTROLLER OVERTEMP.** | Die Temperatur des Controllers hat 70 °C überschritten. Oder Die Temperatur des Kontrollerkühlkörpers ist über 60 °C. | Warten bis die Temperatur unter den Schwellenwert gesunken ist. Die Pumpe durch zweimalige Betätigung der START-Taste neustarten. |

| MELDUNG | BESCHREIBUNG | BEHEBUNG |
|---|---|---|
| **TOO HIGH L0AD** | Die Pumpen ist stromaufnahme größer als die vorgesehene. | Sicherstellen, daß der Pumpenrotor ungehindert drehen kann. Die Pumpe durch zweimalige Betätigung der START-Taste neustarten. |
| **SHORT CIRCUIT** | Während des Normalbetriebs (nach der Startphase) erfolgt ein Kurzschluß der Ausgangsverbindung. | Die Verbindung zwischen Pumpe und Controller prüfen. Die Pumpe durch zweimalige Betätigung der START-Taste neustarten. |
| **SYSTEM OVERRIDE** | Die Pumpe wurde durch ein von einem entfernten Kontakt kommendes Notsignal gestoppt. | Das Netzkabel des Controllers ausstecken und die Störungsursache beheben. Das Netzkabel wieder anschließen und die Pumpe durch zweimalige Betätigung der START-Taste neustarten. |
| **OVERVOLTAGE** | Defekt im Versorgungsbereich des Controllers bzw. der Controller hat ein falsches Signal erhalten. | Die Pumpe durch zweimalige Betätigung der START-Taste neustar-ten. Erscheint die Meldung wieder sollte der Agilent-Wartungs-dienst gerufen werden. |
| **RUN UP TIME** | Anlaufzeitüberschreitung. | Prüfen Sie die Einrichtung der Anlaufzeit. Sie muss entsprechend dem Kundenprozess angepasst werden. Prüfen Sie die Menge der Gaslast, die in der Pumpe fließt. |



# 3 Mode d’emploi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Traduction de la mode d’emploi originale

# Indications generales

Cet appareillage a été conçu en vue d'une utilisation professionnelle. Il est conseillé à l'utilisateur de lire attentivement cette notice d'instructions ainsi que toute autre indication supplémentaire fournie par Agilent, avant l'utilisation de l'appareil. Agilent décline par conséquent toute responsabilité en cas d'inobservation totale ou partielle des instructions données, d'utilisation incorrecte de la part d'un personnel non formé, d'opérations non autorisées ou d'un emploi contraire aux réglementations nationales spécifiques. Les contrôleurs de la série TwisTorr 305 FS Remote sont des convertisseurs de fréquence, contrôlés par un microprocesseur, réalisés avec des éléments à l'état solide et ayant des capacités d'autodiagnostic et d'autoprotection.

Caractéristiques du contrôleur:

- Caractère opérationnel de front /à distance / sériel
- Pilotage à 24 Vdc du ventilateur de refroidissement pompe
- Pilotage vent valve
- Lecture vitesse pompe suite à la commande d'arrêt (lecture vitesse d'arrêt)
- Lecture de la pression
- Interface Profibus (facultatif)
- Attribution automatique tension d'entrée.

Les paragraphes suivants donnent toutes les indications nécessaires à garantir la sécurité de l'opérateur pendant l'utilisation de l'appareillage. Des renseignements plus détaillés se trouvent dans l'appendice "Technical Information".

**Cette notice utilise les signes conventionnels suivants:**

**AVERTISSEMENT!**

**Les messages d'avertissement attirent l'attention de l'opérateur sur une procédure ou une manoeuvre spéciale qui, si elle n'est pas effectuée correctement, risque de provoquer de graves lésions..**

**ATTENTION!** Les messages d'attention apparaissent avant certaines procédures qui, si elles ne sont pas observées, pourraient endommager sérieusement l'appareillage.

**NOTE** Les notes contiennent des renseignements importants, isolés du texte.

# Emmagasinage

Pendant le transport et l'emmagasinage des contrôleurs, il faudra veiller à respecter les conditions environnementales suivantes:

- température: de - 20 °C à + 70 °C
- humidité relative: de 0% à 95 % (non condensante).

# Preparation pour l'installation

Le contrôleur est fourni dans un emballage de protec-tion spécial; si l'on constate des marques de dommages pouvant s'être produits pendant le transport, contacter aussitôt le bureau de vente local.

Pendant l'opération d'ouverture de l'emballage, veiller tout particulièrement à ne pas laisser tomber le contrôleur et à ne lui faire subir aucun choc.
Ne pas jeter l'emballage dans la nature. Le matériel est entièrement recyclable et il est conforme aux directives CEE 85/399 en matière de protection de l'environnement.

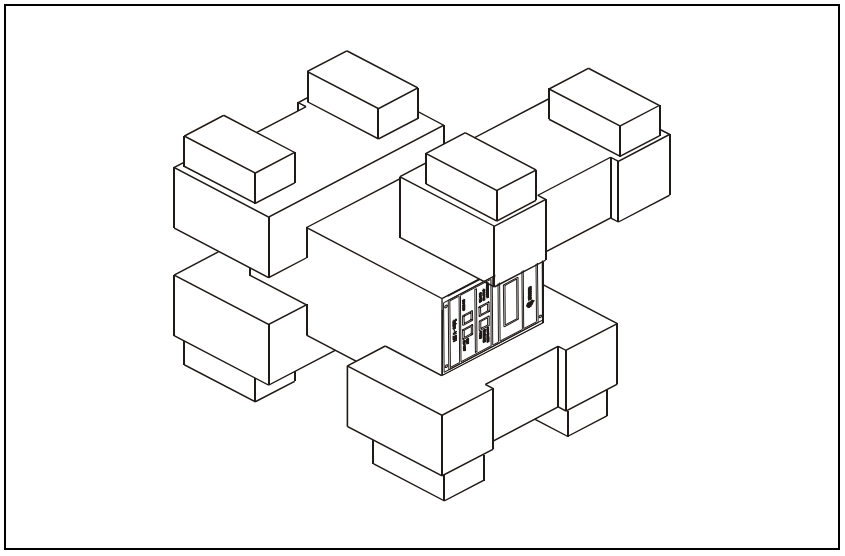


**Figure 1** Emballage du Contrôleur

# Installation

**AVERTISSEMENT!**

**Pour la sécurité de l'utilisateur, le contrôleur ne doit être utilisé qu'en intérieur et doit être branché au moyen d'un câble d'alimentation à 3 fils (cf. tableau des pièces de rechange qui peuvent être commandées) avec une fiche du type approuvé au niveau international. Afin d'éviter toute décharge électrique et satisfaire aux conditions requises CE, il faut toujours utiliser ce câble d'alimentation, en introduisant la fiche dans une prise électrique pourvue d'un branchement approprié à la terre. A l'intérieur du contrôleur se développent de hautes tensions qui peuvent causer de graves dommages et même la mort. Avant d'effectuer toute opération d'installation ou d'entretien du contrôleur, le débrancher de la prise d'alimentation.**

**NOTE**

Le contrôleur peut être installé sur une table ou à l'intérieur d'un rack prévu à cet effet. Il est en tout cas nécessaire que l'air de refroidissement puisse circuler librement à l'intérieur de l'appareil. Ne pas installer et/ou utiliser le contrôleur dans des milieux exposés à des agents atmosphériques (pluie, gel, neige), à des poussières, à des gaz de combat ainsi que dans des milieux explosifs ou à risque élevé d'incendie.

Pendant le fonctionnement, il est nécessaire de respecter les conditions environnementales suivantes :

- température: de +5 °C à +45 °C
- humidité relative: de 0 % à 95 % (non condensante).

Pour les autres connexions et pour l'installation des accessoires en option, voir la section "Technical Information".

# Utilisation

Dans ce paragraphe, on indique les principales procédures opérationnelles. Pour tous autres détails et pour les procédures concernant des connexions ou des éléments en option, se reporter au paragraphe "Use" de l'appendice "Technical Information".

Avant d'utiliser le contrôleur, effectuer toutes les connexions électriques et pneumatiques et se référer à la notice de la pompe connectée.

**AVERTISSEMENT!**

**Pour éviter tous dommages aux personnes et à l'appareil, si la pompe est placée sur un plateau d'appui s'assurer que ce dernier est stable. Ne jamais faire fonctionner la pompe si la bride d'entrée n'est pas connectée au système ou n'est pas fermée à l'aide de la bride de fermeture.**

**NOTE** Laisser le connecteur de réenclenchement J1 connecté à sa barrette s'il n'est procédé à aucune connexion extérieure. La pompe à pré-vide et la pompe TwisTorr 305 FS peuvent être mises en marche simultanément.

# Commandes, Indicateurs et Connecteurs

On présente ci-dessous le tableau de commande du Contrôleur ainsi que les tableaux d'interconnexion. Pour de plus amples détails, se reporter à la section "Technical Information".

# Description du Tableau avant

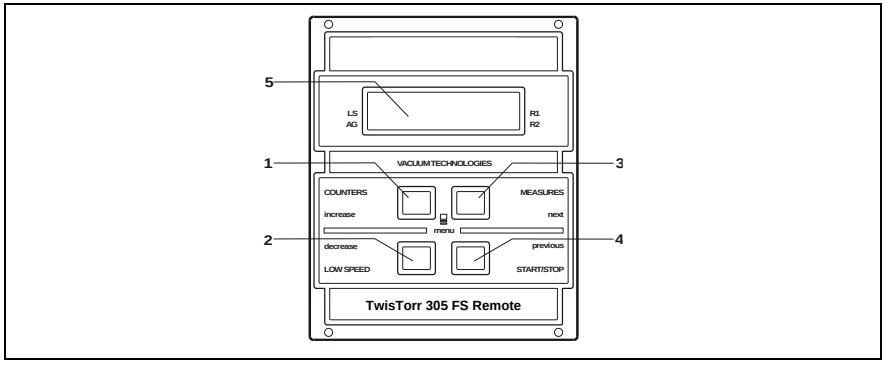



**Figure 2** Tableau avant du Contröleurs TwisTorr 305 FS Remote

| | |
|---|---|
| 1 | Interrupteur rappelant sur l'afficheur les paramètres de cycle number, cycle time et pump life. |
| 2 | Interrupteur de sélection du mode LOW SPEED. Il n'est actif que lorsque le mode de commande est sélectionné depuis le tableau frontal. En le pressant une fois, la pompe tourne à vitesse “stand-by”. En le pressant une deuxième fois, on désactive le mode LOW SPEED. |
| 3 | Interrupteur rappelant sur l'afficheur les paramètres de pump current, pump temperature, pump power et rotational speed. Il est toujours actif, indépendamment du mode de fonctionnement choisi. En pressant simultanément les interrupteurs 3 et 1 pendant 2 secondes au moins, on active un programme avec lequel il est possible de programmer certains paramètres opérationnels. |
| 4 | Interrupteur envoyant les commandes de START, STOP/RESET. Il n'est actif que lorsque le mode de commande est sélectionné depuis le tableau frontal. Une première pression de l'interrupteur active la phase de mise en marche; une deuxième pression provoque l'arrêt de la pompe. Si la pompe s'est arrêtée automatiquement à cause d'une panne, il faut presser cet interrupteur une première fois pour effectuer la mise à zéro du contrôleur et une deuxième fois pour remettre la pompe en marche. |
| 5 | Ecran alphanumérique à cristaux liquides: matrice de points, 2 lignes x 16 caractères. |

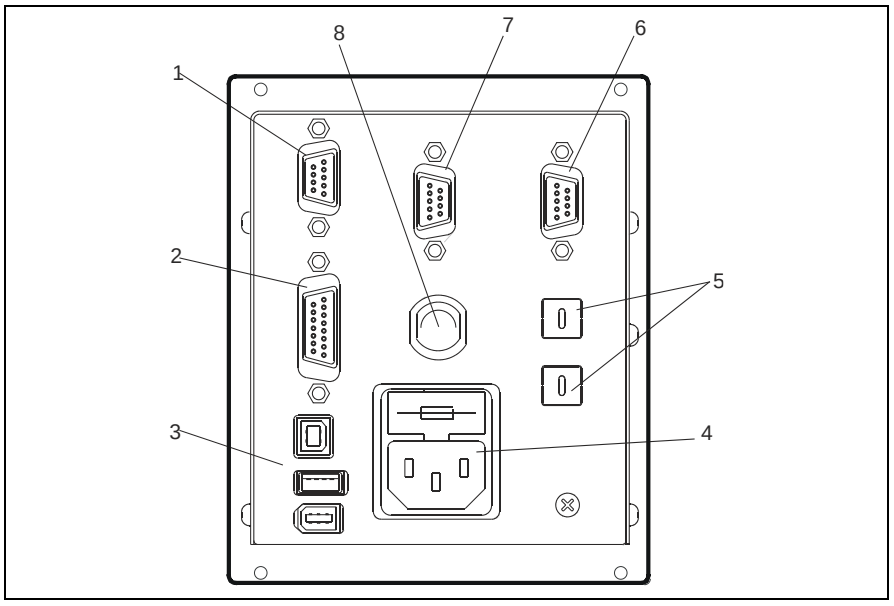



**Figure 3** Tableau arrière du Contrôleur TwisTorr 305 FS Remote

| | |
|---|---|
| 1 | Connecteur d'entrée des signaux logiques (le connecteur d'enclenchement est doté de la barrette de réenclenchement spéciale). |
| 2 | Connecteur signaux logiques en sortie et monitorage fréquence pompe plus sortie analogique programmables. |
| 3 | Connecteur de sortie alimentation (24 Vdc pour le ventilateur de refroidissement pompe, vent valve et calibre). |
| 4 | Module d'entrée alimentation contrôleur qui comprend les fusibles, la prise d'alimentation et le filtre ENC. |
| 5 | Interrupteur à rotation pour établir l'adresse du Profibus. |
| 6 | Profibus (facultatif). |
| 7 | Connecteur sériel pour contrôle à distance |
| 8 | Connecteur pompe. |

# Procedures d'utilisation

## Allumage du Contrôleur

Pour allumer le contrôleur, il suffit d'introduire le câble d'alimentation dans la prise du réseau

## Mise en marche de la Pompe

Pour faire démarrer la pompe il faut habiliter l'entrée de interlock et appuyer sur la touche START du panneau avant.

## Arrêt de la Pompe

Pour arrêter la pompe, presser l'interrupteur STOP du tableau frontal.

# Entretien

Les contrôleurs de la série TwisTorr 305 FS Remote n'exigent aucun entretien. Toute opération doit être effectuée par un personnel agréé.

En cas de panne, il est possible de s'adresser au Service de réparation Agilent ou bien au "Agilent advance exchange service" qui permet d'obtenir un contrôleur régénéré à la place du contrôleur détraqué.

---

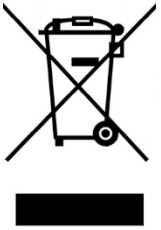
**AVERTISSEMENT!** **Avant d'effectuer toute opération sur le contrôleur, débrancher le câble d'alimentation.**

---

En cas de mise au rebut d'un contrôleur, procéder à son élimination conformément aux réglementations nationales en la matière.

# Mise au rebut

**Signification du logo "WEEE" figurant sur les étiquettes**. Le symbole ci-dessous est appliqué conformément à la directive CE nommée "WEEE".
Ce symbole **(unique-ment valide pour les pays de la Communauté européenne)** indique que le produit sur lequel il est appliqué NE doit PAS être mis au rebut avec les ordures ména-gères ou les déchets industriels ordinaires, mais passer par un système de collecte sélective. Après avoir vérifié les termes et conditions du contrat de vente, l'utilisateur final est donc prié de contacter le fournisseur du dispositif, maison mère ou revendeur, pour mettre en œuvre le processus de collecte et mise au rebut.



Pour en savoir plus, consulter :
http://www.agilent.com/environment/product/index.shtml

# Messages d'erreur

Dans certains cas de panne, l'ensemble de circuits d'autodiagnostic du contrôleur présente certains mes-sages d'erreur indiqués dans le tableau ci-dessous.

**Tab. 1**

| MESSAGE | DESCRIPTION | INTERVENTION |
|---|---|---|
| **RUN UP TIME** | La pompe n'a pas pu atteindre une valeur de vitesse > 700 Hz, dans les limites de la valeur attendue (temps de démarrage, qui est configurable). | Vérifiez la configuration du temps de démarrage : elle doit être définie en fonction du processus client. Vérifiez la charge de gaz à l'intérieur de la pompe et spécifiez-la en conséquence.<br>Vérifiez que le rotor de la pompe peut tourner librement.<br>Redémarrez la pompe. |
| **CHECK CONNECTION TO PUMP** | Dysfonctionnement de la connexion entre la pompe et le contrôleur.<br>Ou bien<br>La pompe a une température inférieure à a 0 °C. | S'assurer que le câble de connexion entre la pompe et le contrôleur et le contrôleur est bien fixé aux deux extrémités et qu'il n'est pas coupé. Presser deux fois l'interrupteur START pour réactiver la pompe. |
| **WAITING INTERLOCK** | Le signal d'interlock situé sur le connecteur P1 est actif à cause de la coupure du court-circuit entre le pin 3 et le pin 8 du connecteur J1 ou à cause de l'ouverture du signal d'interlock extérieur. | Rétablir le court-circuit entre le pin 3 et le pin 8 du connecteur P1 ou fermer le signal d'interlock extérieur. |
| **PUMP OVERTEMP.** | La température du corps de la pompe a dépassé la limite supérieure maximale autorisée, selon le type de gaz sélectionné (Ar : 50 °C ; N2 : 55 °C ; He : 60 °C). | Attendre que la température retourne au-dessous du seuil. Presser deux fois l'interrupteur START pour remettre la pompe en marche. |
| **CONTROLLER OVERTEMP.** | La température du contrôleur a dépassé 70 °C.<br>Ou bien<br>La température du radiateur du contrôleur est supérieure à 60 °C. | Attendre que la température retourne au-dessous du seuil. Presser deux fois l'interrupteur START pour remettre la pompe en marche. |

| MESSAGE | DESCRIPTION | INTERVENTION |
|---|---|---|
| **TOO HIGH L0AD** | Pendant le fonctionnement normal (après la phase de mise en marche), le courant absorbé par la pompe est plus grand que celui qui a été programmé. | S'assurer que le rotor de la pompe a la possibilité de tourner librement. Presser deux fois l'interrupteur START pour remettre la pompe en marche. |
| **SHORT CIRCUIT** | Pendant le fonctionnement normal (après la phase de mise en marche), la connexion de sortie est en court-circuit. | Vérifier les connexions entre la pompe et le contrôleur. Presser deux fois l'interrupteur START pour remettre la pompe en marche. |
| **SYSTEM OVERRIDE** | La pompe a été arrêtée par un signal d'alerte provenant d'un contact éloigné. | Débrancher le câble d'alimentation du contrôleur et corriger la cause de l'alerte. Reconnecter le câble d'alimentation et presser deux fois l'interrupteur START pour remettre la pompe en marche. |
| **OVERVOLTAGE** | Il s'est produit une panne de la section d'alimentation du contrôleur, ou bien le contrôleur a reçu un faux signal. | Presser deux fois l'interrupteur START pour remettre la pompe en marche. Si le message se présente à nouveau, s'adresser à Agilent pour l'entretien. |
| **RUN UP TIME** | Interruption du démarrage. | Vérifiez la configuration du temps de démarrage. Elle doit être ajustée en fonction du processus du client.<br>Vérifiez la quantité de charge de gaz qui s'écoule à l'intérieur de la pompe. |

# 4
# Manual de istrucciones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Traducción de las instrucciones originales

# Información general

Este equipo se ha concebido para un uso profesional. El usuario deberá leer atentamente el presente manual de instrucciones y cualquier otra información suplementaria facilitada por Agilent antes de utilizar el equipo. Agilent se considera libre de cualquier responsabilidad debida al incumplimiento total o parcial de las instrucciones, al uso poco apropiado por parte de personal sin formación, a las operaciones no autorizadas o al uso que no cumpla con las normas nacionales específicas. Los controlers de la serie TwisTorr 305 FS Remote son convertidores de frecuencia, controlados por un microprocesador, realizados con componentes en estado sólido y con capacidad de autodiagnosis y autoprotección.

Características del controler:

- Operatividad frontal / remoto / serial
- Pilotaje de 24 Vdc del ventilador de refrigeración bomba
- Pilotaje vent valve
- Lectura velocidad bomba después de activación mando de parada (lectura velocidad de parada)
- Lectura de la presión
- Interfaz Profibus (opcional)
- Configuración automática tensión de entrada.

En los apartados siguientes se facilita toda la información necesaria para garantizar la seguridad del operador durante el uso del equipo.
Una información más detallada se facilita en el Suplemento "Technical Information".

**Este manual utiliza los símbolos convencionales siguientes:**

**¡ADVERTENCIA!**

**Los mensajes de advertencia atraen la atención del operador sobre un procedimiento o una operación específica que, al no realizarse correctamente, podría provocar graves lesiones personales.**

**¡ATENCIÓN!** Los mensajes de atención se visualizan antes de procedimientos que, al no respetarse, podrían provocar daños al equipo.

**NOTA** Las notas contienen información importante extraída del texto.

# Almacenamiento

Durante el transporte y el almacenamiento de los controlers se deberá cumplir con las condiciones ambientales siguientes:

- temperatura: de -20 °C a +70 °C
- humedad relativa: 0 – 95 % (no condensadora)

# Preparación para la instalación

El controler se suministra en un embalaje de protección especial; si se observan señales de daños, que podrían haberse producido durante el transporte, ponerse en contacto con la oficina de venta más cercana.

Durante la operación de desembalaje, prestar una atención especial a no dejar caer el controler y evitarle golpes. No dispersar el embalaje en el medio ambiente. El material es totalmente reciclable y cumple con la directiva CEE 85/399 para la preservación del medio ambiente.

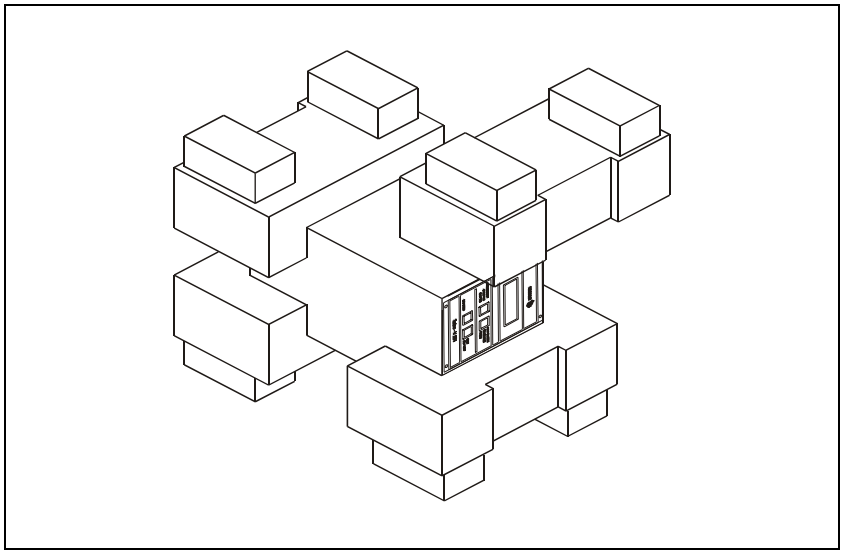


**Figura 1** Embalaje de los Controlers

# Instalación

**¡ADVERTENCIA!**

**El controlador está diseñado sólo para su uso en interiores y para mantener la seguridad del usuario debe ser alimentado mediante un cable de 3 conductores (v. tabla de las piezas de recambio solicitables) con un tipo de clavija aprobado a nivel internacional. Para evitar el riesgo de descargas eléctricas y cumplir con los requisitos CE, utilizar siempre este cable de alimentación, conectando la clavija a una toma eléctrica dotada con una adecuada conexión a tierra. Dentro del controlador se desarrollan altas tensiones que pueden causar graves daños o la muerte. Antes de efectuar cualquier operación de instalación o mantenimiento del controlador, desconectarlo del enchufe de alimentación.**

**NOTA**

El controler puede instalarse en una mesa o dentro de un rack específico. En cualquier caso, es necesario que el aire de refrigeración pueda circular libremente alrededor del aparato. No instalar y/o utilizar el controler en ambientes expuestos a agentes atmosféricos (lluvia, hielo y nieve), polvos, gases agresivos, en ambientes explosivos o con alto riesgo de incendio.

Durante el funcionamiento es necesario que se respeten las condiciones ambientales siguientes:

- temperatura: de +5 °C a +45 °C
- humedad relativa: 0 – 95 % (no condensadora).

Para otras conexiones y la instalación de los accesorios opcionales, véase la sección “Technical Information”.

# Uso

En este apartado se citan los procedimientos operativos principales. Para más detalles y para procedimientos que impliquen conexiones u opcionales especiales, les remitimos al apartado “Use” del anexo “Technical Informations”.

Antes de usar el controler efectuar todas las conexiones eléctricas y neumáticas y consultar el manual de la bomba conectada.

**¡ADVERTENCIA!**

**Para evitar lesiones a las personas y al aparato, si la bomba está apoyada sobre una mesa cerciorarse que es estable. No poner en marcha nunca la bomba si la brida de entrada no está conectada al sistema o no está cerrada con la brida de cierre.**

**NOTA**

El conector di cierre J1 ha de dejarse conectado con su conector puente si no se efectúa ninguna conexión exterior. La bomba pre-vacío y la bomba TwisTorr 305 FS pueden encenderse simultáneamente.

# Mandos, Indicadores y Conectores

A continuación se ilustran el panel de mando del controler y los paneles de interconexión. Para más detalles consultar la sección “Technical Information”.

# Descripción del panel frontal

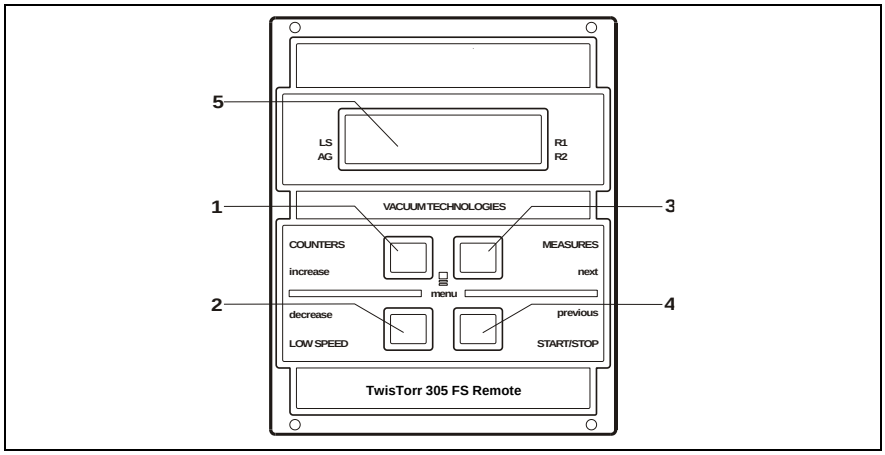



**Figura 2** Panel frontal del Controller TwisTorr 305 FS Remote

| | |
|---|---|
| 1 | Pulsador para que aparezcan en el display los parámetros cycle number, cycle time y pump life |
| 2 | Pulsador para la selección del modo LOW SPEED. Está activado sólo cuando está seleccionado el modo de mando del panel frontal. Apretando una vez, la bomba gira a velocidad “stand-by”. Apretándolo una vez más se desactiva el modo LOW SPEED. |
| 3 | Pulsador para que aparezcan en el display los parámetros pump current, pump temperature, pump power y rotational speed. Está siempre activado independientemente del modo de funcionamiento elegido. Apretando juntos los pulsadores 3 y 1 durante 2 segundos por lo menos, se activa un programa con el cual se pueden programar algunos parámetros operativos. |
| 4 | Pulsador para enviar los mandos de START, STOP/RESET. Está activo sólo cuando se selecciona el modo de mando del panel frontal. Apretándolo una vez se activa la fase de puesta en marcha; apretándolo otra vez se para la bomba. Si la bomba se ha parado automáticamente a causa de una avería, hay que apretar este pulsador primero una vez para efectuar el reset del controler y la segunda vez para volver a poner en marcha la bomba. |
| 5 | Display alfanumérico de cristales líquidos: matriz de puntos, 2 líneas x 16 caracteres. |

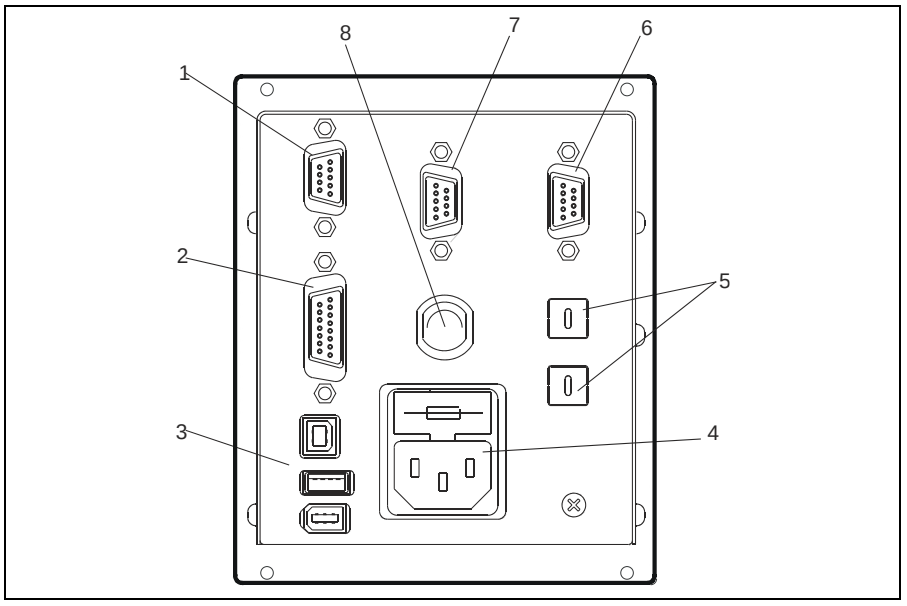



**Figura 3** Panel trasero del controler TwisTorr 305 FS Remote

| | |
|---|---|
| 1 | Conector de entrada de las señales lógicas (el conector de acoplamiento se suministra con el conector puente específico de cierre). |
| 2 | Conector señales lógicas en salida y monitoreo frecuencia bomba y salida analógica programable. |
| 3 | Conector de salida alimentación (24 Vdc para el ventilador de refrigeración bomba, vent valve y calibre). |
| 4 | Módulo de entrada alimentación controler con fusibles, toma de alimentación y filtro ENC. |
| 5 | Conmutador de rotación para configurar la dirección del Profibus. |
| 6 | Profibus (opcional). |
| 7 | Conector serial para control remoto. |
| 8 | Conector bomba. |

# Procedimientos de uso

## Encendido del controler

Para encender el controler es suficiente introducir el cable de alimentación en la toma de red.

## Puesta en marcha de la Bomba

Para activar la bomba es necesario habilitar la entrada de interlock y pulsar el botón START situado en el panel frontal.

## Parada de la Bomba

Para detener la bomba hay que apretar el pulsador STOP del panel frontal.

# Mantenimiento

Los controlers de la serie TwisTorr 305 FS Remote no necesitan ningún mantenimiento. Cualquier operación ha de ser efectuada por personal autorizado. En caso de avería es posible utilizar el servicio de reparación Agilent o del "Agilent advance exchange service", que permite obtener un controler regenerado en vez del averiado.

---

**¡ADVERTENCIA!** **Antes de efectuar cualquier operación en el controler desenchufar el cable de alimentación.**

---

En caso de que un controler se tenga que desguazar, efectuar su eliminación respetando las normas nacionales específicas.

# Eliminación

**Significado del logotipo "WEEE" presente en las etiquetas.** El símbolo que se indica a continuación, es aplicado en observancia de la directiva CE denominada "WEEE". Este símbolo **(válido sólo para los países miembros de la Comunidad Europea)** indica que el producto sobre el cual ha sido aplicado, NO debe ser eliminado junto con los residuos comunes sean éstos domésticos o industriales, y que, por el contrario, deberá ser sometido a un procedimiento de recogida diferenciada. Por lo tanto, se invita al usuario final, a ponerse en contacto con el proveedor del dispositivo, tanto si éste es la casa fabricante o un distribuidor, para poder proveer a la recogida y eliminación del producto, después de haber efectuado una verificación de los términos y condiciones contractuales de venta.

Para obtener más información, consulte:
http://www.agilent.com/environment/product/index.shtml

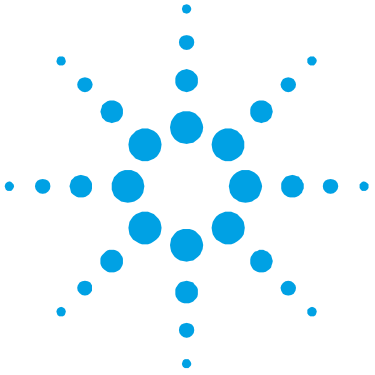
# Mensajes de error

En algunos casos de avería los circuitos de autodiagnosis del controler presenta algunos mensajes de error detallados en la tabla siguiente.

**Tab. 1**

| MENSAJE | DESCRIPCIÓN | ACCIÓN CORRECTIVA |
|---|---|---|
| **RUN UP TIME** | La bomba no ha podido alcanzar un valor de velocidad >700 Hz, dentro del valor esperado (Tiempo puesta en funcionamiento, que es configurable). | Compruebe la configuración del tiempo de puesta en funcionamiento: debería establecerse según el proceso del cliente. Compruebe la carga de gas que fluye dentro de la bomba y ajuste de manera adecuada. Compruebe que el rotor de la bomba pueda girar libremente. Reinicie la bomba. |
| **CHECK CONNECTION TO PUMP** | Mal funcionamiento en la conexión entre la bomba y el Controler. O bien La bomba tiene una temperatura inferior a 0 °C. | Comprobar que el cable de conexión entra en la bomba y el controler está bien fijado por ambos extremos y no está interrumpido. Apretar dos veces el pulsador START para volver a poner en marcha la bomba. |
| **WAITING INTERLOCK** | Está activa la señal de interlock presente en el conector P1 a causa de la interrupción del cortocircuito entre el pin 3 y el pin 8 del conector J1, o a causa de la apertura de la señal de interlock externo. | Eliminar el cortocircuito entre el pin 3 y el pin 8 del conector P1, o cerrar la señal de interlock exterior. |
| **PUMP OVERTEMP.** | La temperatura del cuerpo de la bomba ha excedido el límite máximo permitido, que depende del tipo de gas seleccionado (Ar: 50°C; N2: 55°C; He: 60°C) | Esperar a que la temperatura vuelva por debajo del umbral. Apretar dos veces el pulsador START para volver a poner en marcha la bomba. |
| **CONTROLLER OVERTEMP.** | La temperatura del controler ha superado los 70 ºC. O bien La temperatura del radiador del controler es superior a 60 °C. | Esperar a que la temperatura vuelva por debajo del umbral. Apretar dos veces el pulsador START para volver a poner en marcha la bomba. |

| MENSAJE | DESCRIPCIÓN | ACCIÓN CORRECTIVA |
|---|---|---|
| **TOO HIGH L0AD** | La corriente absorbida por la bomba es superior a la programada. | Comprobar que el rotor de la bomba tiene la posibilidad de girar libremente.<br>Apretar dos veces el pulsador START para volver a poner en marcha la bomba. |
| **SHORT CIRCUIT** | Durante el funcionamiento normal (tras la fase de puesta en marcha) la conexión de salida está en cortocircuito. | Comprobar las conexiones entre la bomba y el controler.<br>Apretar dos veces el pulsador START para volver a poner en marcha la bomba. |
| **SYSTEM OVERRIDE** | La bomba ha sido parada por una señal de emergencia procedente de un contacto remoto. | Desenchufar el cable de alimentación del controler y corregir la causa de la emergencia.<br>Volver a conectar el cable de alimentación y apretar dos veces el pulsador START para volver a poner en marcha la bomba. |
| **OVERVOLTAGE** | Se ha producido una avería en la sección de alimentación del controler o el controler ha recibido una señal espurio. | Apretar dos veces el pulsador START para volver a poner en marcha la bomba.<br>Si el mensaje se vuelve a presentar dirigirse a Agilent para el mantenimiento. |
| **RUN UP TIME** | Tiempo de arranque agotado. | Controlar la configuración del tiempo de arranque. Debe ajustarse según el proceso del cliente.<br>Comprobar la cantidad de carga de gas que fluye dentro de la bomba. |



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原始说明的翻译

# 一般信息

本设备供专业人员使用。在操作设备之前，用户应阅读本说明书和安捷伦提供的任何其他信息。安捷伦对因不遵守这些指示、未经培训的人员不当使用、未经授权干扰设备或任何违反特定国家标准规定的行为而发生的任何事件概不负责。

TwisTorr 305 FS 遥控器是微处理器控制的固态变频器，具有自诊断和自我保护功能。

控制器功能：

前部/远程/串行操作

24Vdc 泵风扇冷却驱动器

通风阀驱动

停止后泵速度读数（停止速度读数）

压力读数

输入电压自动设置。

profibus接口（可选）

以下各段包含使用设备时确保操作员安全的所有必要信息。 附录“技术信息”中提供了详细信息。

本手册使用以下标准协议：

**警告！**

**警告消息让操作员特别注意特定的程序或操作，如果执行不当，可能导致严重的人身伤害。**

小心！ 小心消息会在操作过程之前显示，如果未注意到，可能会损坏设备。

注意 注意包含从文本中摘录的重要信息。

# 存储

运输和存储控制器时，应满足以下环境要求：

- 温度： -20 ° C 至 + 70 ° C
- 相对湿度： 0 -95 % （无冷凝）

# 安装准备

控制器具有特殊的保护性包装。 如果这个包装在运输过程中出现损坏的迹象，请联系当地的销售办事处。 打开控制器包装时，请确保不要摔落控制器或使其受到任何形式的撞击。 请勿以未经授权的方式处置包装材料。 该材料是100％可回收的，并且符合EEC指令85/399。

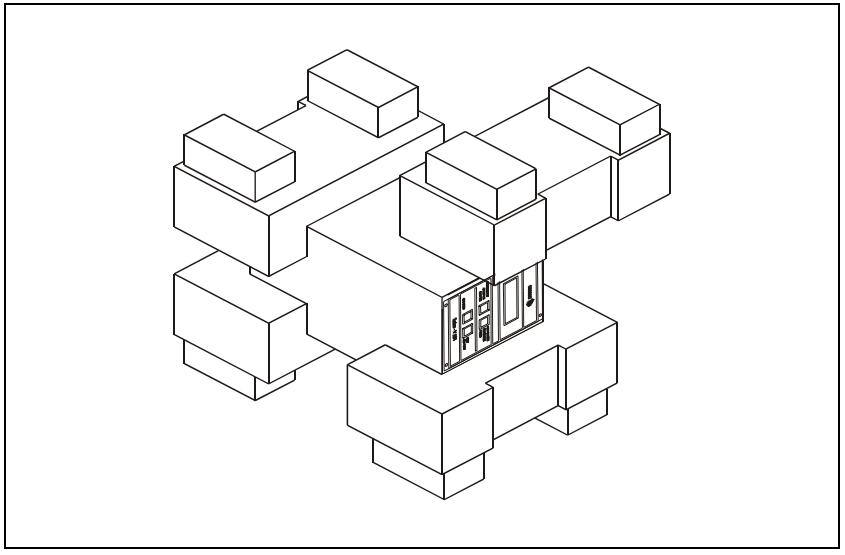

**图1 控制器包装**

# 安装

**警告！**

**该控制器仅供室内使用，必须使用 3 线电源线供电（参见可订购部件表）和插头（得到国际认可），以确保用户的安全。将此电源线和插头与正确接地的电源插座一起使用，以避免电击并满足 CE 要求。 控制器中产生的高压会导致严重的人身伤害甚至死亡。 维修本机之前，请断开输入电源线的连接。**

**注意**

TwisTorr 305 FS 遥控器可以用作台式装置或机架模块，但必须放置在适当的位置，以使自由的空气可以流过孔。请勿在暴露于大气物质（雨、雪、冰）、灰尘、腐蚀性气体或爆炸性环境或高火灾风险的环境中安装或使用控制器。

在操作过程中，必须遵守以下环境条件：

- 温度：从+5° C至+45° C;
- 相对湿度： 0 - 95 % （无冷凝）。

有关上述和其他连接的详细信息以及安装选项的详细信息，请参阅附录"技术信息"。

# 使用

本段描述了基本的操作程序。 附录“技术信息”的“使用”段落中提供了涉及可选连接或选件的详细信息和操作过程。

在操作TwisTor 305 FS 遥控器之前，请进行所有真空歧管和电气连接，并参考TwisTorr 305 FS 泵说明书。

**警告！**

**为避免人员受伤和设备损坏，如果泵放在桌子上，请确保其保持稳定。如果泵入口未连接至系统或堵死，则切勿操作 TwisTorr 305 FS 泵。**

**注意**

如果未进行外部连接，则输入信号 J1 连接器应保持在包括运输链接在内的位置。 前级泵和 TwisTorr 305 FS 泵可以同时打开。

# 控件、指示器和连接器

以下段落说明了控制器控制面板和互连面板。有关更多详细信息，可参考附录的"技术信息"。

# 前面板说明

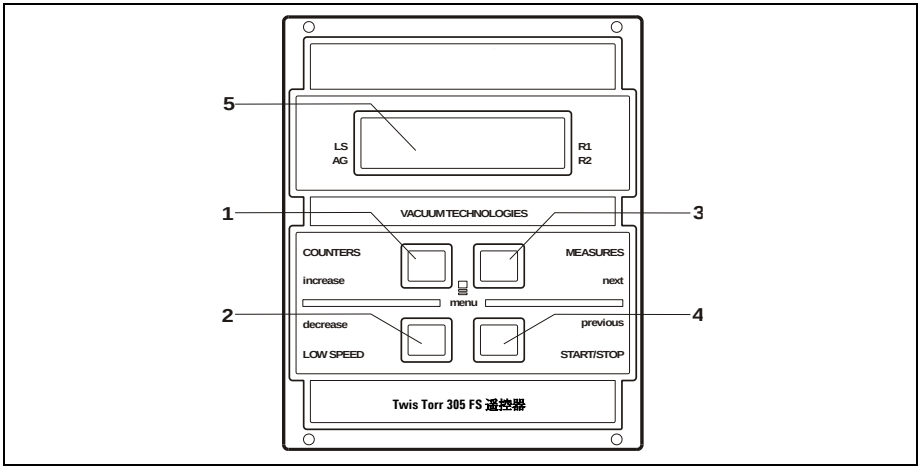


**图 2 控制器TwisTor 305 FS 远程前面板**

| | |
|---|---|
| 1 | 键盘按钮可在显示屏上调出循环次数、循环时间和泵寿命。 |
| 2 | 用于选择低速模式的键盘按钮。仅当选择了前面板操作时，它才会处于活动状态。按下一次，泵以"备用"速度运行。要取消选择模式，请再次按下按钮。 |
| 3 | 键盘按钮可调用显示屏上的泵电流、泵温、泵功率和转速。无论选择何种操作模式，它始终处于活动状态。如果将按钮 3 和 1 按下至少 2 秒钟，，则可以将控制器置于一个例程中，以便对一些操作参数进行编程。 |
| 4 | 用于选择“开始”、“停止”/“重置”模式的键盘按钮。仅当选择了前面板操作时，它才会处于活动状态。在开始阶段开始后按;如果再次按下，则会停止泵。如果泵因故障自动停止，<br>则必须按下此按钮一次以重置控制器，而后再次按下按钮以重新启动泵。 |
| 5 | LCD 背光字母数字显示：点阵 2 行 x16 个字符。 |

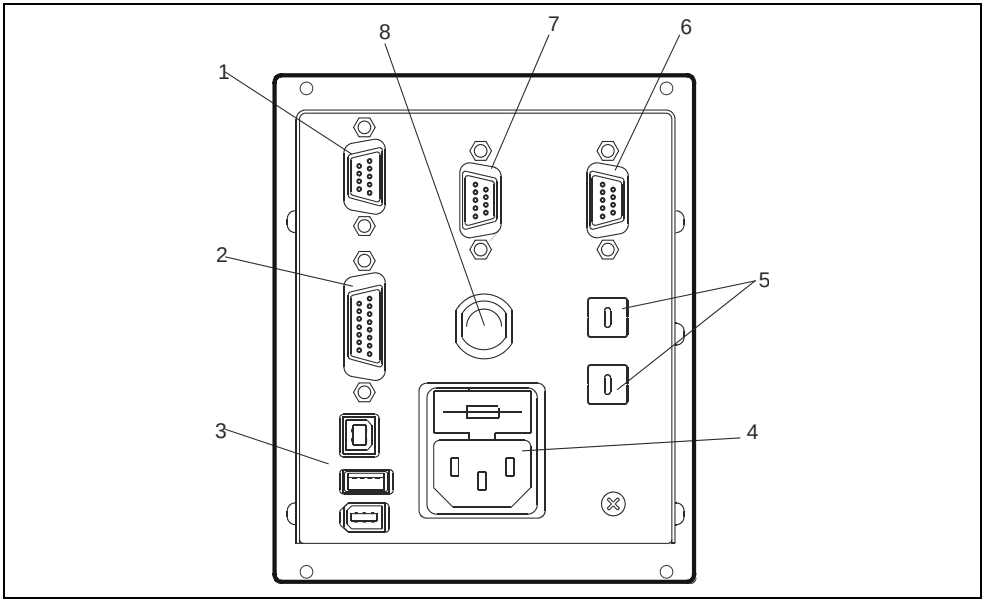


**图 3 控制器TwisTor 305 FS 远程后面板**

| | |
|---|---|
| 1 | 逻辑输入信号连接器（连接链路提供的配对连接器）。 |
| 2 | 逻辑输出信号连接器和泵频率监视器加上可编程模拟输出。 |
| 3 | 功率输出连接器（24 Vdc 用于泵冷却风扇、排气阀和仪表）。 |
| 4 | 控制器电源输入模块由电源保险丝、电源插座和 EMC 滤波器组成。 |
| 5 | 用于 Profibus 地址设置的旋转开关。 |
| 6 | Profibus（可选）。 |
| 7 | 远程控制串行连接器。 |
| 8 | 泵电缆（5 米长）。 |

# 使用流程

## 控制器启动

如要启动控制器，请将电源线与合适的电源连接。

## 启动泵

如要启动泵，请确认互锁输入，然后按控制器前面板上的"开始"按钮。

## 停止泵

如要关闭泵，请按控制器前面板上的 “停止” 按钮。

# 维护

TwisTorr 305 FS 远程系列控制器不需要任何维护。在控制器上执行的任何工作必须由授权人员执行。

发生故障时，可以使用安捷伦维修服务。通过安捷伦提前更换控制器。

---

警告！ **在对控制器执行任何工作之前，请断开控制器与电源的连接。**

---

如果要报废泵，则必须按照特定的国家标准进行处理。

# 处置方式

**标签中"WEEE"徽标的含义**

以下符号根据 EC WEEE（废弃电气和电子设备）指令进行应用。 该符号（**仅在欧洲共同体国家有效**）表示其适用的产品不得与普通家庭或工业废物一起处理，而必须送往差别化废物收集系统。 因此，请最终用户在检查合同销售条款和条件后，联系设备的供应商（无论是母公司还是零售商）以启动收集和处置流程。

有关详细信息，请参阅：

http://www.agilent.com/environment/product/index.shtml

# 错误消息

对于特定类型的故障，控制器将自行诊断错误，并显示下表中描述的消息。

表 1

| 消息 | 描述 | 修复操作 |
|---|---|---|
| **运行 时间** | 泵无法在期望值（运行时间，可配置）内达到> 700 Hz 的速度值。 | 检查运行时间设置：应根据客户流程相应设置。检查泵内流动气体负载并相应地进行调整。检查泵转子是否可以自由旋转。重新启动泵。 |
| **检查与泵的连接** | 泵和控制器之间的连接错误。<br>或<br>泵的温度低于 0 ° C | 检查控制器和泵之间的连接。<br>按下"开始"按钮两次以启动泵。 |
| **等待互锁** | P1 连接器的互锁信号是通过中断 J1 连接器的引脚 3 和 8 之间的链接来激活的，或者是因为外部互锁信号已打开。 | 重置 P1 连接器引脚 3 和引脚 8 之间的短路，或关闭外部互锁信号。 |
| **泵温度过高** | 泵体的温度已超过允许的最大上限，具体取决于所选气体的类型（Ar：50° C;$N_2$： 55° C;He：60° C) | 等待温度降至阈值以下。按下"开始"按钮两次以启动泵。 |
| **控制器温度过高** | 控制器环境温度超过 70° C。<br>或<br>控制器的散热器温度高于 60° C。 | 等待温度降至阈值以下。按下"开始"按钮两次以启动泵。 |

| 消息 | 描述 | 修复操作 |
| --- | --- | --- |
| **过高负载** | 泵抽取的电流高于编程电流。 | 检查泵转子是否可自由旋转。按下"开始"按钮两次以启动泵。 |
| **短路** | 启动阶段后，输出连接短路。 | 检查泵和控制器之间的连接和短路。 按下“开始”按钮两次以启动泵。 |
| **系统覆盖** | 通过远程触点提供的紧急停止信号来停止泵。 | 拆下控制器电源线并检查紧急情况。然后重新连接电源线，然后按“开始”按钮两次以启动泵。 |
| **电压** | 控制器电源电路有故障，或控制器收到尖峰信号。 | 按下"开始"按钮两次以启动泵。如果消息仍然存在，请致电安捷伦服务。 |
| **运行时间** | 超时 | 检查运行时间的设置。 必须根据客户流程对其进行调整。 检查泵内流动的气体负荷量 |

# 6 使用方法


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説明書原文の翻訳

# 概要情報

この装置は技術者による使用を対象としています。使用者は、この取扱説明書とAgilentにより提供される他の追加情報もあわせて、装置を操作する前に全てお読みください。 Agilentは、部分的であってもこれらの取扱説明に従わない場合や、訓練されていない人による不適切な使用、装置への認められていない干渉、または特定の国家規格の規定に相いれないいかなる行動によって生じたいかなる事態にも責任を負いません。

TwisTorr 305 FS リモートコントローラーは、マイクロ・プロセッサーにより制御され、ソリッドステートの自己診断機能と自己防護機能がついた周波数変換器 です。

コントローラーの特徴：

- フロント / リモート / 直列操作
- 24Vdc ポンプ用ファン冷却ドライブ
- 通気弁ドライブ
- 停止コマンド後のポンプ速度の計測 （停止速度の計測）
- 圧力計測
- 入力電力の自動設定
- Profibus インターフェース（オプション）

次の章は、装置を使用中に操作者の安全を保証するために必要な全ての情報を含みます。詳細情報は、「技術的情報」の追記に記載されています。

この説明書は下記の規格プロトコルを使用しています：

警告!

**「警告」のメッセージは、もし正しく操作されない場合に、重大な人身障害につながる可能性がある特定の操作や実行に対する操作者の注意の必要性を示しています。**

注意

「注意」のメッセージは、もし遵守されていない場合に装置に損害が生じる可能性を示しています。

注

「注」は、テキストからの重要な情報を含みます。

# 保管

- コントローラーを輸送、保存する時は、下記の環境仕様を超過してはいけません：
- 温度範囲： -20 °C から + 70 °C まで
- 相対湿度範囲： 0 から 95 %まで（結露なし）

# 取り付けの準備

コントローラーは、特殊な保護梱包で提供されます。もしこの梱包に移送の間に生じた可能性のある破損が見受けられる場合、現地販売事務所に問い合わせてください。コントローラーの梱包を開ける際には、落とさない、またはいかなる形での衝撃を与えないようにしてください。不適切な方法で梱包材料を破棄しないでください。梱包材料は100%リサイクルが可能で、EEC指令85/399に従っています。

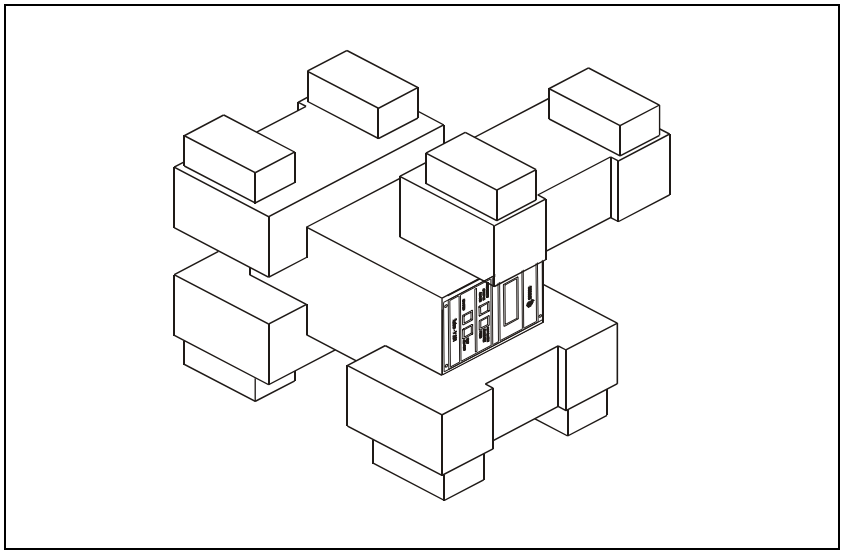


**図 1** コントローラーの梱包

# 取り付け

**警告!**

**コントローラーは、屋内のみの使用が対象で、使用者の安全のために３本のワイヤー電源コード（注文可能な部品を参照）とプラグ（国際的に認可されたもの）で電源が供給されなければいけません。電気ショックを避け、また CE 要件を満たすために、この電源コードとプラグを適切に設置された電源ソケットと合わせて使用してください。**

**コントローラー内で発達した高電圧は、重大な損傷や死亡を引き起こす可能性があります。ユニットを点検する前に、入力電源ケーブルの接続を断ってください。**

注

TwisTorr 305 FS リモートコントローラーは、ベンチユニットまたはラックモジュールとして使用できますが、穴を通して自由に通気が取れるように所定の位置に設置されなければいけません。大気物質（雨、氷、雪）、ちり・ホコリ、侵略的ガスなどが露出する環境、または爆発の可能性がある環境、または燃えやすい環境下では、取り付けまたは使用しないでください。

操作中、下記の環境状況は遵守されなければいけません：

- 温度： +5 °C から+45 °Cまで;
- 相対湿度： 0 – 95 % （結露なし）

上記についてと他の接続に関して、またオプションの取り付けについての詳細な情報は、「技術的情報」の追記をご覧ください。

# 使用

この章は、基本操作手順を説明しています。オプション的な接続、またはオプションについての詳細な情報と操作手順は、「技術的情報」の追記の「使用」の章に記載されています。

TwisTorr 305 FSリモートコントローラーを操作する前に、全ての真空マニホールドと電気接続を作成し、TwisTorr 305 FS ポンプの説明書をお読みください。

---

**警告!**

**人体への損傷や装置への損害を避けるために、もしポンプがテーブルの上に置かれている場合には安定していることを確かめてください。もしポンプ吸入口がシステムに接続されていない、または抜け落ちている場合には、TwisTorr 305 FS ポンプを決して操作しないでください。**

---

注

入力信号 J1 コネクターは、もし外部接続が作成された場合には移送リンクを含む位置に置かれるようにしてください。プレポンプと TwisTorr 305 FS ポンプは同時にオンに切り替えられなければなりません。

---

# コントロール、指示器、コネクター

次の章は、コントローラーのコントロールパネルと相互接続パネルを図解しています。詳細情報は、「技術的情報」の追記に記載されています。

# フロントパネル説明

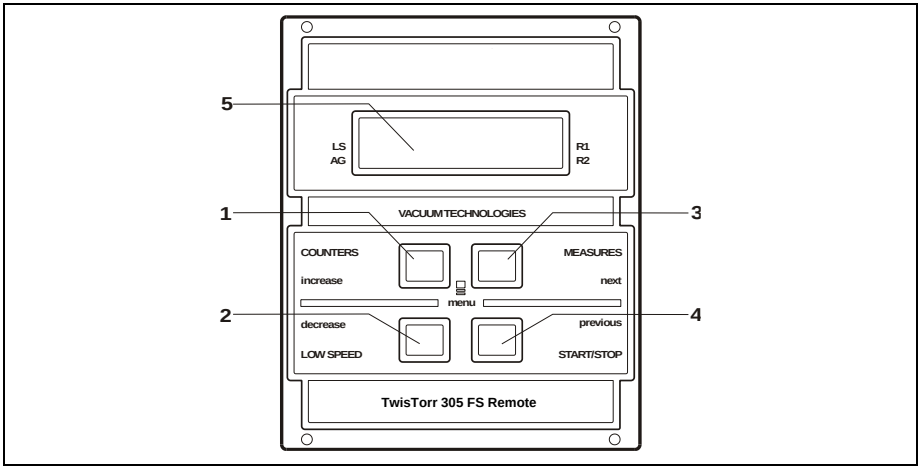



**図 2** コントローラー TwisTorr 305 FS リモートフロントパネル

| | |
|---|---|
| 1 | サイクル数、サイクル時間、ポンプの寿命をディスプレイ上に表示させるキーボードプッシュボタン。 |
| 2 | 低速モードの選択用キーボードプッシュボタン。フロントパネル操作が選択された時のみアクティブになります。１回押すとポンプは「待機」速度で作動します。モードの選択を解除するには、プッシュボタンを再度押してください。 |
| 3 | ポンプの電流、ポンプの温度、ポンプの電源と回転速度をディスプレイ上に表示させるキーボードプッシュボタン。選択された操作モードに関わらず、これは常にアクティブです。プッシュボタン 3 と 1 は、最低でも２秒間一緒に押された場合に、コントローラーはいくつかの操作パラメーターをプログラム可能なルーチン下におかれます。 |
| 4 | 「開始、停止/リセット」モードの選択用キーボードプッシュボタン。フロントパネル操作が選択された場合のみアクティブになります。１回押すと起動フェーズが開始します；もし再度押すとポンプを停止します。もしポンプが障害・故障により自動的に停止された場合、コントローラーをリセットするには１回、ポンプをリスタートするには２回このプッシュボタンを押してください。 |
| 5 | LCD バックライトの英数字ディスプレイ：ドットマトリックス 2 列 x 16 文字。 |

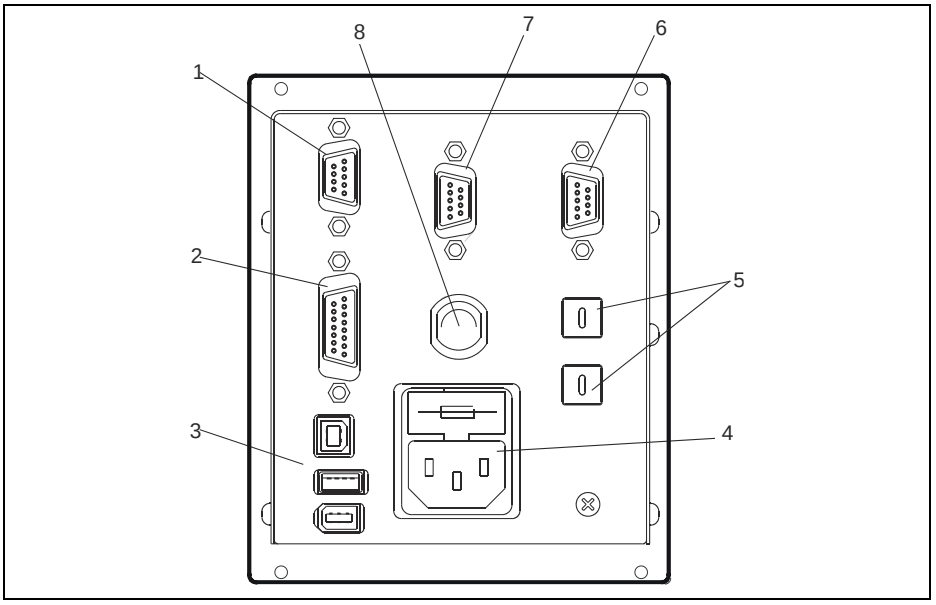



**図 3** コントローラーTwisTorr 305 FS リモートリアパネル

| | |
|---|---|
| 1 | ロジック入力信号コネクター（リンクと共に供給される組み合わせコネクター）。 |
| 2 | ロジック出力信号コネクターとポンプ周波数モニター、また プログラム可能なアナログ出力。 |
| 3 | 電力出力コネクター（ポンプ冷却ファン、通気弁と計器用の 24 Vdc） |
| 4 | 主要ヒューズ、主要ソケットと EMC フィルターから構成されるコントローラー電力エントリーモジュール。 |
| 5 | Profibus のアドレス設定用回転スイッチ。 |
| 6 | Profibus （オプション）。 |
| 7 | リモートコントロールシリアルコネクター。 |
| 8 | ポンプケーブル（長さ 5m）。 |

# 使用手順

## コントローラーの起動

コントローラーを起動するには、電源ケーブルを適切な電源プラグに接続してください。

## ポンプの開始

ポンプを開始するには、インターロック入力を確認して、コントローラーフロントパネル上の「開始」のプッシュボタンを押してください。

## ポンプの停止 Pump Shutdown

ポンプを停止するには、コントローラーフロントパネル上の「停止」のプッシュボタンを押してください。

# メンテナンス

TwisTorr 305 FS リモートシリーズコントローラーは、いかなるメンテナンスも必要としません。コントローラーになされるいかなる作業も、認可された者により遂行されなければなりません。

障害・故障が起こった際には、Agilentの修理サービスを利用することもできます。コントローラーの代替品は、Agilentを通したアドバンスエクスチェンジのサービスを基に利用可能です。

---

**警告!**

**コントローラー上にいかなる作業を遂行する前に、供給源から接続を断ってください。**

---

もしポンプを廃棄する場合には、特定の国の規定に基づき廃棄されなければなりません。

# 廃棄

**ラベル上に表示された「WEEE」ロゴの意味**

下記の記号はEC WEEE指令（電気電子廃棄物 指令）に従い適用されたものです。この記号（欧州諸共同体でのみ有効）は、製品は通常の家庭ゴミまたは産業廃棄物と一緒に廃棄されてはいけないこと、また分化された廃棄物収集システムへ送られなければいけないことを示します。従って、エンドユーザーは、販売の契約条件を確認した後に、収集と廃棄工程を始めるために、親会社かもしくは小売業者であろうと、機器の供給者へ問い合わせることが推奨されます。

さらなる情報は下記をご確認ください：

http://www.agilent.com/environment/product/index.shtml

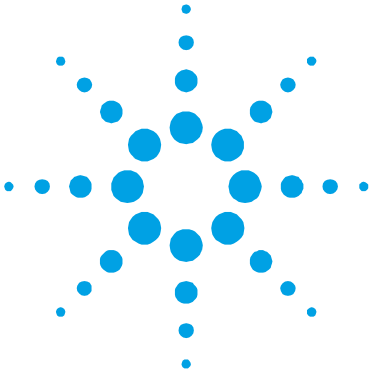
# エラーメッセージ

あるタイプの機能不全に対し、コントローラーはエラーを自己診断し、下記に説明されるメッセージが表示されます。

**タブ.1**

| メッセージ | 説明 | 修理動作 |
|---|---|---|
| **起動時間** | ポンプは、期待値内で>700 Hz の速度値に達することができませんでした（起動時間は設定可能です）。 | 起動時間の設定の確認：カスタマー手順に従って設定することが推奨されます。ポンプ内に流入されるガス量を確認し、それに従って調節してください。<br>ポンプのローターが障害なく回転できるか確認してください。<br>ポンプをリスタートしてください。 |
| **ポンプへの接続を確認** | ポンプとコントローラー間の誤った接続。<br>または<br>ポンプの温度が 0 °C 以下。 | コントローラーとポンプ間の接続を確認してください。<br>ポンプを開始するには、「開始」のプッシュボタンを２回押してください。 |
| **インターロックを待機** | P1 コネクターのインターロック信号は、J1 コネクターのピン 3 と 8 の間のリンクの中断により、もしくは外部のインターロック信号が開いていることによりアクティベートされます。 | J1 コネクターのピン 3 と 8 の間の短絡をリセットするか、または外部のインターロック信号を閉じてください。 |
| **ポンプの過剰温度** | 選択されたガスのタイプによりますが、ポンプ本体の温度が許容される最大温度を超えています。<br>(Ar: 50°C; N2: 55°C; He: 60°C) | 温度が閾値以下になるまでお待ちください。<br>ポンプを開始するには、「開始」のプッシュボタンを２回押してください。 |
| **コントローラーの過剰温度** | コントローラーの環境温度が 70 °C を超えています。<br>または<br>コントローラーのラジエーター温度が 60 °C 以上です。 | 温度が閾値以下になるまでお待ちください。<br>ポンプを開始するには、「開始」のプッシュボタンを２回押してください。 |

| メッセージ | 説明 | 修理動作 |
|---|---|---|
| **過剰負荷** | ポンプにより引き出された電流量がプログラムされたものよりも高くなっています。 | ポンプのローターが障害なく回転できるか確認してください。ポンプを開始するには、「開始」のプッシュボタンを２回押してください。 |
| **短絡** | 起動フェーズの後、出力接続がショートしました。 | 接続を確認してください。 |
| **システムオーバーライド** | ポンプは、リモートコンタクト経由で提供された緊急停止信号により停止されました。 | コントローラーの電源ケーブルを抜き、緊急状態を確認してください。それから電源ケーブルを再接続し、ポンプを開始するには、「開始」のプッシュボタンを２回押してください。 |
| **過電圧** | コントローラーの電源供給回路が故障しているか、またはコントローラーがスパイクを受けました。 | ポンプを開始するには、「開始」のプッシュボタンを２回押してください。<br>もしメッセージが消えない場合、Agilent に問い合せてください。 |
| **起動時間** | 起動時間切れ | 起動時間の設定の確認。カスタマー手順に従って調整してください。ポンプ内に流入されるガス量を確認してください。 |



# 7 Instructions for Use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Original Instructions

# General Information

This equipment is destined for use by professionals. The user should read this instruction manual and any other additional information supplied by Agilent before operating the equipment. Agilent will not be held responsible for any events occurring due to non-compliance, even partial, with these instructions, improper use by untrained persons, non-authorised interference with the equipment or any action contrary to that provided for by specific national standards.

The TwisTorr 305 FS Remote Controllers are micro-processor-controlled, solid-state, frequency converter with self-diagnostic and self-protection features.

Controller features:

- Front / Remote / Serial Operation
- 24Vdc pump fan cooling drive
- Vent valve drive
- Pump speed reading after stop command (stop speed reading)
- Pressure reading
- Input voltage auto setting.
- Profibus interface (optional)

The following paragraphs contain all the information necessary to guarantee the safety of the operator when using the equipment. Detailed information is supplied in the appendix "Technical Information".

**This manual uses the following standard protocol:**

**WARNING!**

**The warning messages are for attracting the attention of the operator to a particular procedure or practice which, if not followed correctly, could lead to serious injury.**

**CAUTION!** The caution messages are displayed before procedures which, if not followed, could cause damage to the equipment.

**NOTE** The notes contain important information taken from the text.

# Storage

When transporting and storing the controllers, the following environmental requirements should be satisfied:

- temperature: from -20 °C to + 70 °C
- relative humidity: 0 – 95 % (without condensation)

# Preparation for Installation

The controller is supplied in a special protective packing. If this shows signs of damage which may have occurred during transport, contact your local sales office. When unpacking the controller ensure that it is not dropped or subjected to any form of impact. Do not dispose of the packing materials in an unauthorized manner. The material is 100 % recyclable and complies with EEC Directive 85/399.

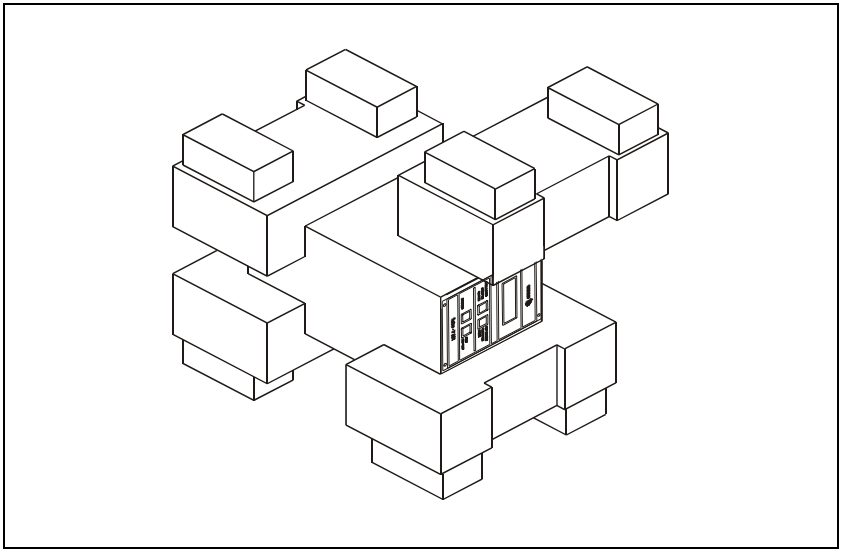


**Figure 1** Controller packing

# Installation

**WARNING!**

**The controller is designed for indoor use only and must be powered with 3-wire power cord (see orderable parts table) and plug (internationally approved) for user's safety. Use this power cord and plug in conjunction with a properly grounded power socket to avoid electrical shock and to satisfy CE requirements. High voltage developed in the controller can cause severe injury or death. Before servicing the unit, disconnect the input power cable.**

**NOTE**

TwisTorr 305 FS Remote Controller can be used as a bench unit or a rack module, but it must be positioned so that free air can flow through the holes. Do not install or use the controller in an environment exposed to atmospheric agents (rain, snow, ice), dust, aggressive gases, or in explosive environments or those with a high fire risk.

During operation, the following environmental conditions must be respected:

- temperature: from +5 °C to +45 °C;
- relative humidity: 0 – 95 % (without condensation).

See the appendix “Technical Information” for detailed Information about the above mentioned and the other connections, and about the options installation.

# Use

This paragraph describes the fundamental operating procedures. Detailed information and operating procedures that envolve optional connection or option are supplied in the paragraph “USE” of the appendix “Technical Information”.

Make all vacuum manifold and electrical connections and refer to TwisTorr 305 FS  pump instruction manual before operating the TwisTorr 305 FS Remote Controller.

**WARNING!**

**To avoid injury to personnel and damage to the equipment, if the pump is laying on a table make sure it is steady. Never operate the TwisTorr 305 FS pump if the pump inlet is not connected to the system or blanked off.**

**NOTE**

The input signal J1 connector should be left in position including the shipping links if no external connections are made. The forepump and TwisTorr 305 FS pump can be switched on at the same time.

# Controls, Indicators and Connectors

The following paragraph illustrates the Controller control panel and interconnection panel. More details are contained in the appendix “Technical Information".

# Front Panel Description

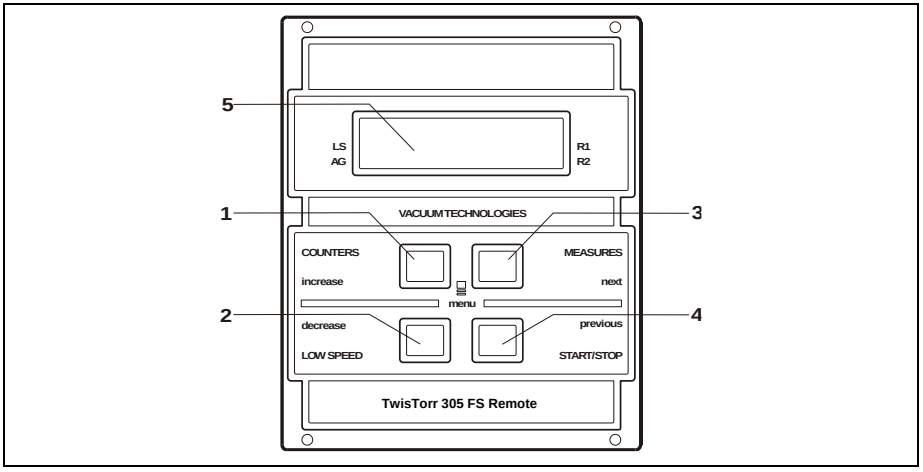



**Figure 2** Controller TwisTorr 305 FS Remote Front Panel

| | |
|---|---|
| 1 | Keyboard push-button to recall on the display the cycle number, cycle time and pump life. |
| 2 | Keyboard push-button for LOW SPEED mode selection. It is active only when the front panel operation has been selected. Pressed once, the pump runs at “stand-by” speed. To unselect the mode, press the push-button again. |
| 3 | Keyboard push-button to recall on the display the pump current, pump temperature, pump power and rotational speed. It is always active regardless of the operating mode selected. Push-buttons 3 and 1, if pressed together for at least 2 seconds, put the controller in a routine where it is possible to program some operation parameters. |
| 4 | Keyboard push-button for START, STOP/RESET mode selection. It is active only when the front panel operation has been selected. By pressing once the starting phase begins; if pressed again it stops the pump. If the pump has been stopped automatically by a fault, this push-button must be pressed once to reset the controller and a second time to restart the pump. |
| 5 | LCD back-lighted alphanumeric display: dot matrix 2 lines x 16 characters. |

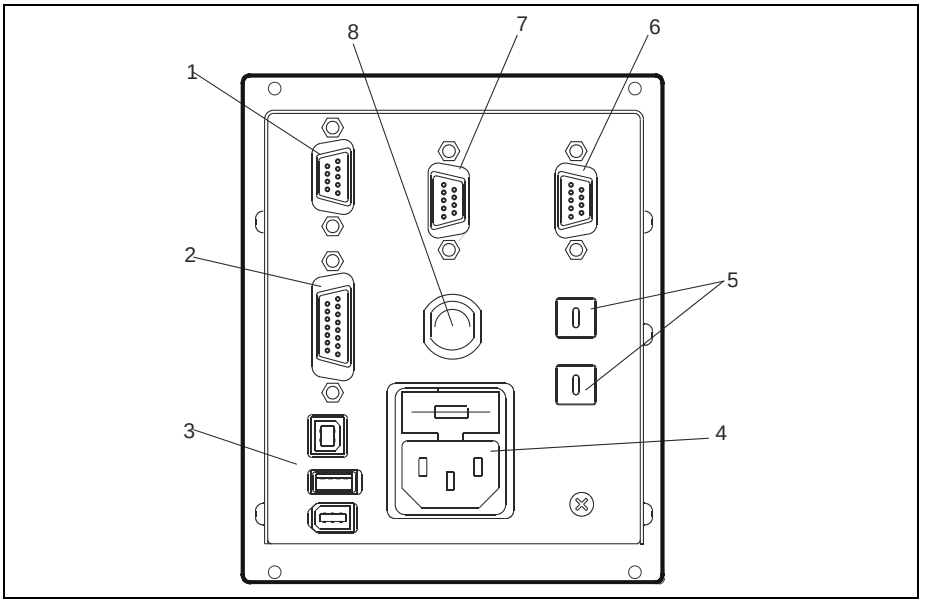



**Figure 3** Controller TwisTorr 305 FS Remote Rear panel

| | |
|---|---|
| 1 | Logic input signals connectors (mating connector supplied with link). |
| 2 | Logic output signals connector and pump frequency monitor plus programmable analog output. |
| 3 | Power output connector (24 Vdc for pump cooling fan, Vent Valve and Gauge). |
| 4 | Controller power entry module consisting of mains fuses, mains socket and EMC filter. |
| 5 | Rotary switches for Profibus address setting. |
| 6 | Profibus (Optional). |
| 7 | Remote control serial connector. |
| 8 | Pump cable (5m long). |

# Use Procedure

## Controller Startup

To startup the controller plug the power cable into a suitable power source.

## Starting the Pump

To start the pump, confirm the interlock input and press the START pushbutton on the controller front panel.

## Pump Shutdown

To shutdown the pump press the STOP push-button on the controller front panel.

# Maintenance

The TwisTorr 305 FS Remote series controller does not require any maintenance. Any work performed on the controller must be carried out by authorized personnel.

When a fault has occurred it is possible to use the Agilent repair service. Replacement controllers are available on an advance exchange basis through Agilent.

---

**WARNING!** **Before carrying out any work on the controller, disconnect it from the supply.**

---

If a pump is to be scrapped, it must be disposed off in accordance with the specific national standards.

# Disposal

**Meaning of the "WEEE" logo found in labels**

The following symbol is applied in accordance with the EC WEEE (Waste Electrical and Electronic Equipment) Directive.
This symbol **(valid only in countries of the European Community)** indicates that the product it applies to must NOT be disposed of together with ordinary domestic or industrial waste but must be sent to a differentiated waste collection system. The end user is therefore invited to contact the supplier of the device, whether the Parent Company or a retailer, to initiate the collection and disposal process after checking the contractual terms and conditions of sale.

For more information refer to:
http://www.agilent.com/environment/product/index.shtml

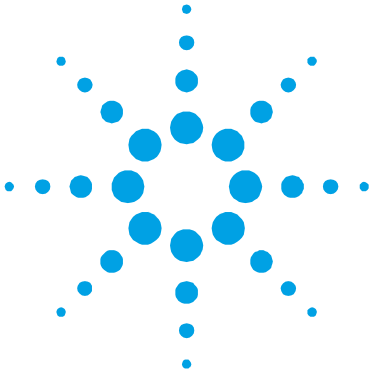
# Error Messages

For a certain type of failure, the controller will self-diagnose the error and the messages described in the following table are displayed.

**Tab. 1**

| MESSAGE | DESCRIPTION | REPAIR ACTION |
|---|---|---|
| **RUN UP TIME** | The pump has not been able to reach a speed value >700 Hz, within the expected value (Run Up Time, which is configurable). | Check for the Run UP Time set-up: it should be set accordingly to the customer process. Check for the gas load flowing inside the pump and adjust it accordingly. Check that the pump rotor can rotate freely. Restart the pump. |
| **CHECK CONNECTION TO PUMP** | Wrong connection between the pump and the controller.<br>Or<br>The pump's temperature is below 0 °C. | Check connection between controller and pump.<br>Press the START push-button twice to start the pump. |
| **WAITING INTERLOCK** | The interlock signal of P1 connector is activated by an interruption of the link between pin 3 and 8 of J1 connector, or because the external interlock signal is open. | Reset the short circuit between pin 3 and pin 8 of P1 connector, or close the external interlock signal. |
| **PUMP OVERTEMP.** | The temperature of the pump body has exceeded the maximum upper limit allowed, dependent on the type of gas selected (Ar: 50°C; N2: 55°C; He: 60°C) | Wait until the temperature decrease below threshold value.<br>Press the START push-button twice to start the pump. |
| **CONTROLLER OVERTEMP.** | The controller environment temperature exceeds 70 °C.<br>Or<br>The controller's radiator temperature is above 60 °C. | Wait until the temperature decrease below threshold value.<br>Press the START push-button twice to start the pump. |

| MESSAGE | DESCRIPTION | REPAIR ACTION |
|---|---|---|
| **TOO HIGH L0AD** | The current drawn by the pump is higher than programmed. | Check that the pump rotor is free to rotate. Press the START push-button twice to start the pump. |
| **SHORT CIRCUIT** | After the starting phase the output connection is shorted. | Check connections and shortages between pump and controller. Press the START push-button twice to start the pump. |
| **SYSTEM OVERRIDE** | The pump is stopped by an emergency stop signal provided via a remote contact. | Remove the controller power cable and check the emergency condition. Then reconnect the power cable and press the START push-button twice to start the pump. |
| **OVERVOLTAGE** | Controller power supply circuitry is faulty, or the Controller received a spike. | Press the START push-button twice to start the pump.<br>Should the message still be present, call the Agilent service. |
| **RUN UP TIME** | Run Up Time out. | Check for the Run Up Time set-up. It has to be adjusted accordingly to the customer process. Check the amount of the gas load which is flowing inside the pump. |



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# TwisTorr 305 FS Remote Controller Description

The controller is available in two models (see orderable parts table):

- with RS 232-485 option
- with Profibus option

The controller is a solid-state frequency converter with the following features:

- Drives the pumps of the TwisTorr 305 FS family.
- Powers the pump cooling fan
- Drives the vent valve.
- Provides and acquires the pressure of the wide range gauge.
- Remote I/O is compatible with the previous version (ref. TwisTorr 305 FS Remote Controller). Serial protocol is in most of the cases compatible with the previous version (ref. TwisTorr 305 FS Remote Controller) but, due to the additional features that have been implemented on this unit, some serial windows have been revised in the data format/content. Please check the chapter “Windows Meanings” in order to get further details about the serial windows specifications.
- Navigator default serial compatible with the previous RS 232 and 485 version.
- Speed reading after stop command.

See the following diagram for the connections and orderable parts.

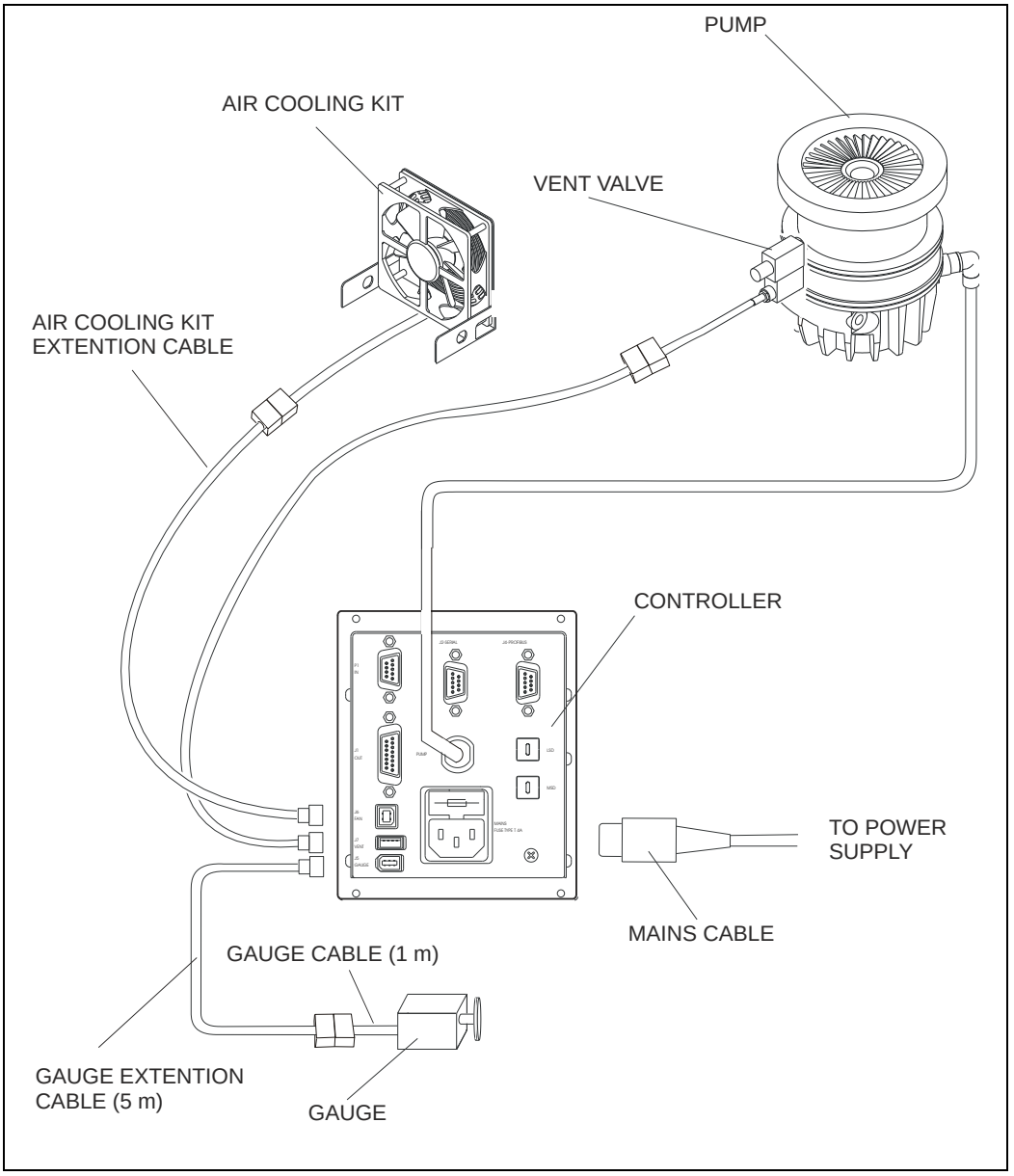



**Figure 4** TwisTorr 305 FS Remote Controller – Connections

# Controller Specifications

**Tab. 2**

| | |
|---|---|
| Input: | |
| Voltage | 100, 240 Vac (voltage fluctuation +/- 10%) |
| Frequency | 50 to 60 Hz |
| Power | 450 VA |
| Fuse | 2 x T4 A (slow blow) 250 V |
| Output: | |
| Voltage | 75 Vac |
| Frequency | 1010 Hz |
| Power | 150 W |
| Environment storage | -20 °C to +70 °C<br>0 – 95 % |
| Operating | +5 - +45 °C<br>0 – 90 % |
| Applied norr. | EN 61010 -1<br>EN 61326-1<br>EN 50581<br>EMC Directive 2014/30/EU<br>RoHS Directive 2011/65/EU |
| Weight: | 1.7 Kg (3.2 lbs) |
| Pollution Degree | 2 |
| Installation Category | II |
| Acoustic noise (ISO7779) | LpA < 70 dB(A), normal operation, operator position |

**NOTE** The Controller must be positioned in a way that the mains cable can be easily disconnected from the controller mains power inlet (the controller is not equipped with a mains switch).

# Controller Outline

The outline dimensions for the TwisTorr 305 FS Remote Controllers are shown in the following figure.

**NOTE** TwisTorr 305 FS Remote Controller can be used as a bench unit or as a rack module, but it must be positioned so that free air can flow through the holes.

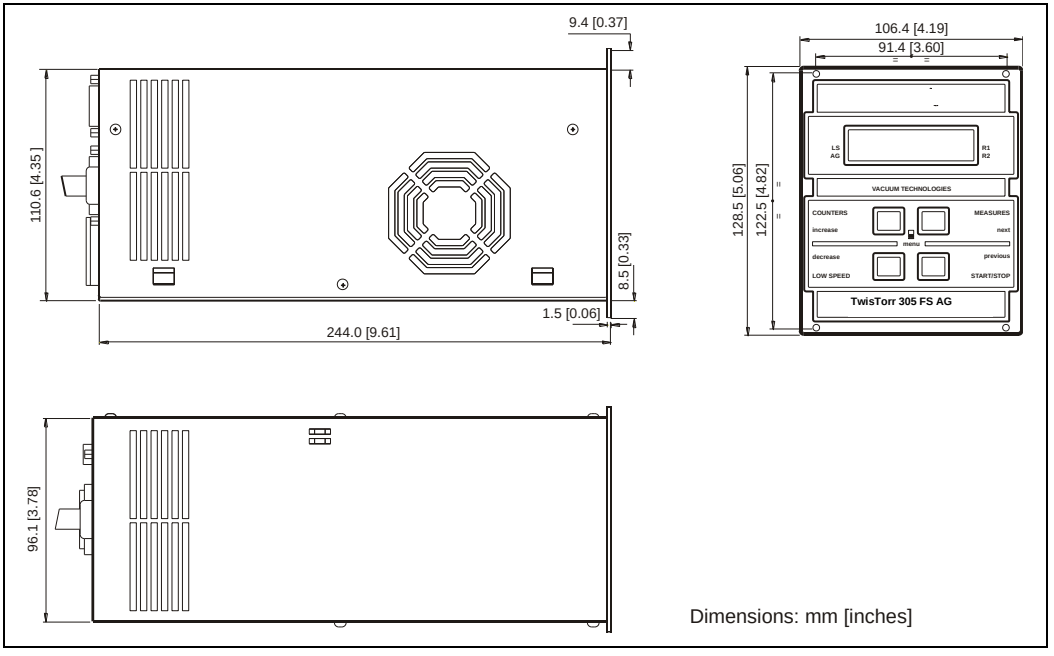



**Figure 5** Controller outline

# Controller Connection

## J6 – Fan

The 24 Vdc, 150 mA maximum output voltage is present after START pushbutton is pressed and will remain present until a fault condition is displayed on front panel display or the turbopump is stopped.

This is a dedicated output for the optional TwisTor 305 pump cooling fan (see orderable parts table).

If you already have fan installed, use the available adapter cable to connect to the pump.

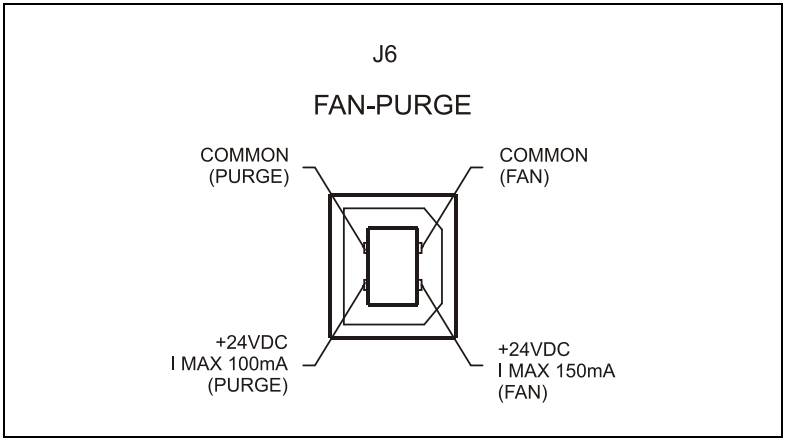



**Figure 6** Fan Connector

# J7 – Vent

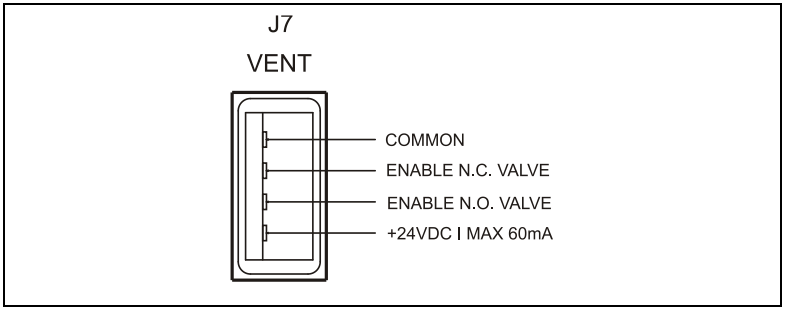



**Figure 7** Vent Connector

This is dedicated 24 Vdc connector to control the optional vent valve (see orderable parts table). The vent valve can be driven by controller automatically or by serial line.

If you already have a vent valve installed 110 Vac powered, this valve must be replaced by a new model (see orderable parts table).

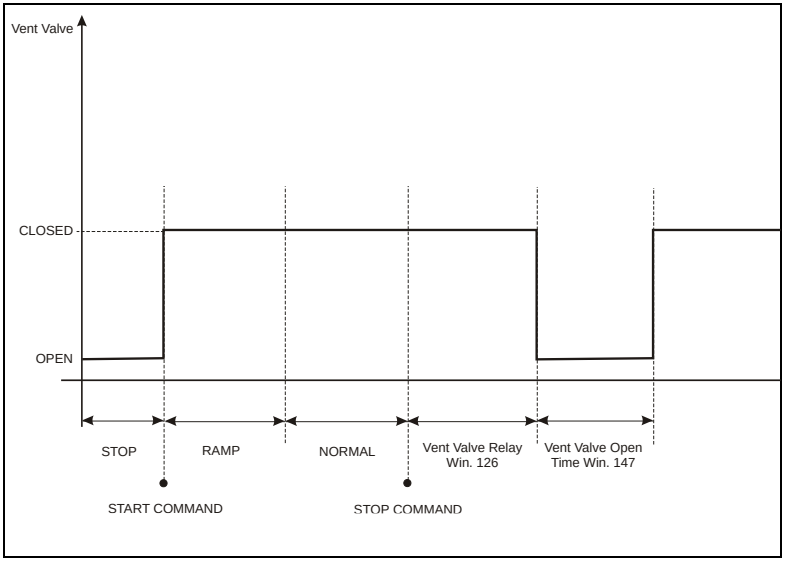



**Figure 8** Vent Valve diagram in “Auto” mode

# P1 – Input

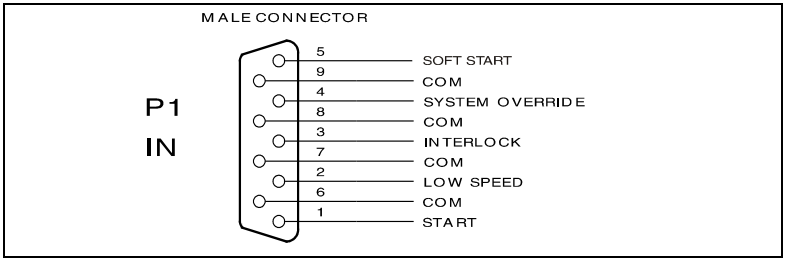



**Figure 9** P1 input connector

All the logic input to the controller **must** be connected at J1 mating connector. With the provided P1 mating connector (shipped with pin 3 and pin 8 shorted) make the connections with AWG 24, (0.24 mm2) or smaller wire to the pins indicated in the figure to obtain the desired capability.

The following table describes the signals available on the connector.

**Tab. 3**

| Pins | Name | Description | Electrical | Note |
|---|---|---|---|---|
| 1-com | Start/Stop | Contact closed = Start<br>Contact open = Stop | Optically isolated<br>Vlow, max = 10v<br>Imax = 5mA<br>Imin (on) = 2mA | Active only in Remote Mode operation |
| 2-com | Low Speed | Contact closed = Low Speed<br>Contact open = High Speed | Optically isolated<br>Vlow, max = 10v<br>Imax = 5Ma<br>Imin (on) = 2mA | Active only in Remote Mode operation |
| 3-com | Interlock | Contact closed = Active<br>Contact open = Inactive<br>If active allows the pump running, if inactive stops the pump. | Optically isolated<br>Vlow, max = 10v<br>Imax = 5mA<br>Imin (on) = 2mA | Active in all modes |
| 4-com | System Override | Contact closed<br>Contact open<br>If the contact is open, it allows the pump running; if the contact is closed, it stops the pump and all the others connected devices (Fan, Vent). | Optically isolated<br>Vlow, max = 10v<br>Imax = 5mA<br>Imin (on) = 2mA | Active in all modes |

| Pins | Name | Description | Electrical | Note |
|---|---|---|---|---|
| 5-com | Soft Start | Contact closed= Active<br>Contact open= Inactive<br>If active before the start command activates the spft start procedure.<br>To be used only at first pump run-up. | Optically isolated<br>Vlow, max = 10v<br>Imax = 5mA<br>Imin (on) = 2mA | Active only in Remote Mode operation, and in STOP status. |

The following figure shows a typical contact logic input connection and the related simplified circuit of the controller.

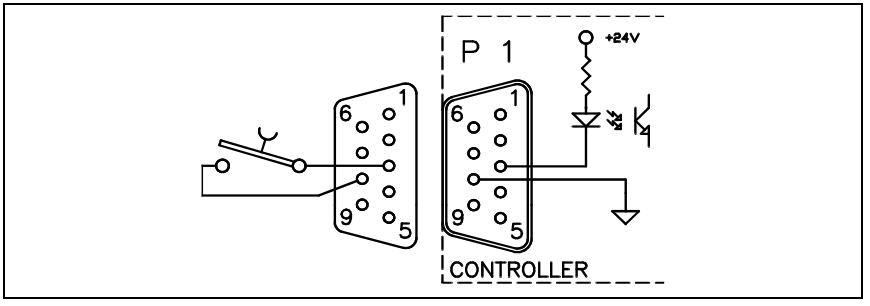



**Figure 10** Typical logic input connection

# J1 – Output

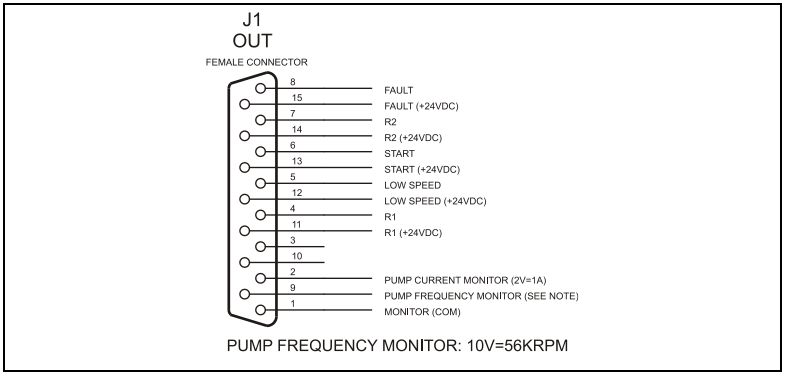



**Figure 11** Logic output connector

All the logic output from the controller must be connected at P2 mating connector. The following table describes the signals available on the connector.

The following figure shows a typical logic output connection (relay coil) but any other device may be connected e.g. a LED, a computer, etc., and the related simplified circuit of the controller.

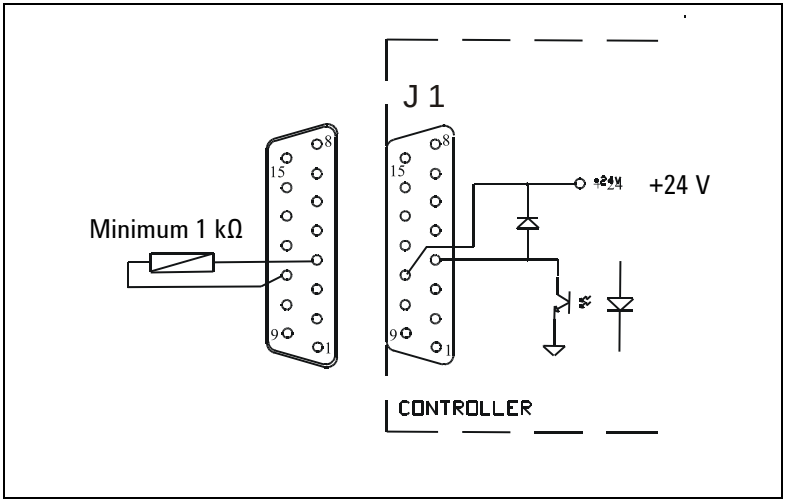



**Figure 12** Digital Output Connection Example

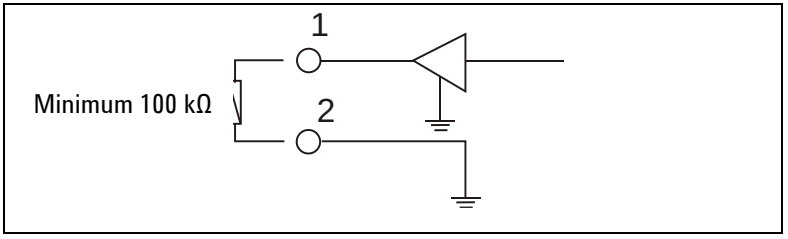



**Figure 13** Analog Output Connection Example

**Tab. 4**

| Pins | Name | Description | Electrical | Note |
|---|---|---|---|---|
| 15-8 | Fault | 0V = no fail<br>24V = fail | Optically isolated<br>Vmax (=open) = 24v<br>Vlow, max = 1,5v<br>Imax = 60mA<br>Pin-8 negative<br>Pin-15 positive | Connect a 10kohm resistor between the 2 pins before measuring voltage<br>A STOP command (by front Panel or serial or Start/stop input) reset the FAIL status. |
| 13-6 | Start | Configurable output. Default setting (win.177 = 0): 24V pump in RAMP state, 0V = other state. If win.177 = 1: 0V = pump in stop or FAIL status, 24V = other state | Optically isolated<br>Vmax (=open) = 24v<br>Vlow, max = 1,5v<br>Imax = 60mA<br>Pin-6 negative<br>Pin-13 positive | Connect a 10kohm resistor between the 2 pins before measuring voltage |
| 12-5 | Low Speed | 24V = low speed active<br>0V = low speed not active | Optically isolated<br>Vmax (=open) = 24v<br>Vlow, max = 1,5v<br>Imax = 60mA<br>Pin-5 negative<br>Pin-12 positive | Connect a 10kohm resistor between the 2 pins before measuring voltage |
| 11-4 | R1 | Programmable Set Point Out can be related to: Frequency, Power, Time Status or Pressure.See following figures for more details. All the setting can be done by: front panel or serial line (win.101 to 105 and 162). | Optically isolated<br>Vmax (=open) = 24v<br>Vlow, max = 1,5v<br>Imax = 60mA<br>Pin-5 negative<br>Pin-12 positive | Connect a 10kohm resistor between the 2 pins before measuring voltage |
| 14-7 | R2 | Programmable Set Point Out Can be related to: Frequency, Power, Time Status or Pressure. See following figures for more details. All the setting can be done by: front panel or serial line (win.171 to 176). | Optically isolated<br>Vmax (=open) = 24v<br>Vlow, max = 1,5v<br>Imax = 60mA<br>Pin-7 negative<br>Pin-14 positive | Connect a 10kohm resistor between the 2 pins before measuring voltage |

| Pins | Name | Description | Electrical | Note |
|---|---|---|---|---|
| 2-1 | Programmable Analog Output | Programmable analog output. Can be related to : frequency, power, pump temperature (linear) or pressure read by the external gauge. The setting can be done by: front panel or serial line (win.111). 0V = 0Hz, 0W, 0°C 10V = 1010Hz, 150W, 100°C See following chart for more details | Optically isolated Rload, min = 10kohm Ripple Vpp,max = 200mV Precision = 5% Resolution = 40mV Pin-1negative Pin-2 positive | Connect a 100kohm resistor between the 2 pins before measuring voltage |
| 9-1 | Frequency Analog Output | Analog output proportional to frequency (linear). 0V = 0Hz 10V = 1010Hz | Optically isolated Rload, min = 10kohm Ripple Vpp,max = 200mV Precision = 1% Resolution = 40mV Pin-1negative Pin-9 positive | |

When the analog output is set to provide pressure signal, the voltage level is proportional to pressure level and it is generated by control unit elaborating the independent input by the active gauge.

# R1 – R2 Output Diagrams

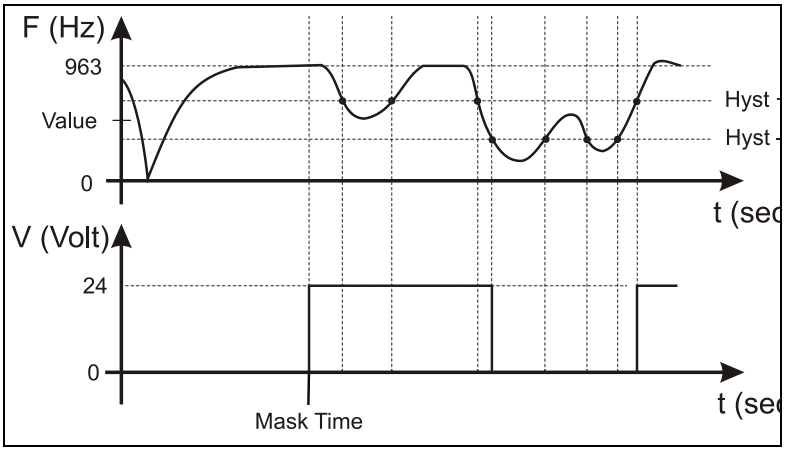



**Figure 14** Diagram 1 – R1 or R2 related to frequency

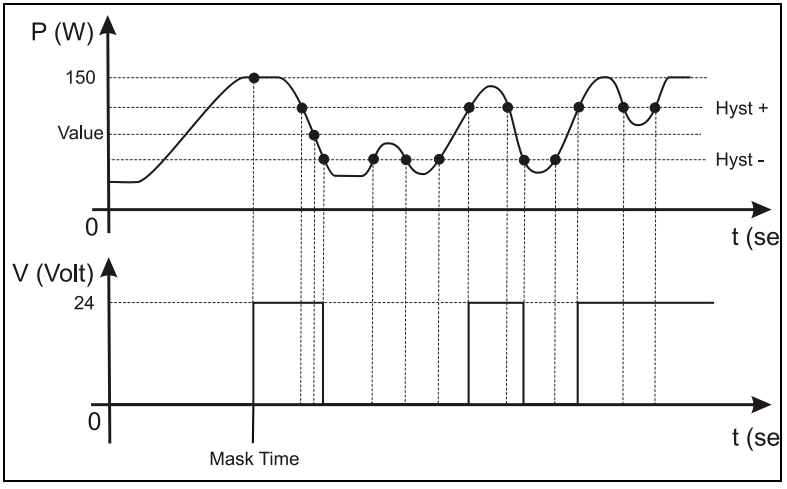



**Figure 15** Diagram 2 – R1 or R2 related to power

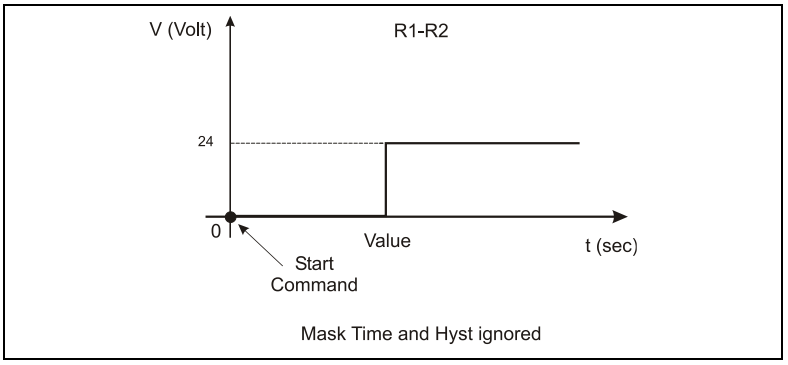



**Figure 16** Diagram 3 – R1 or R2 related to time

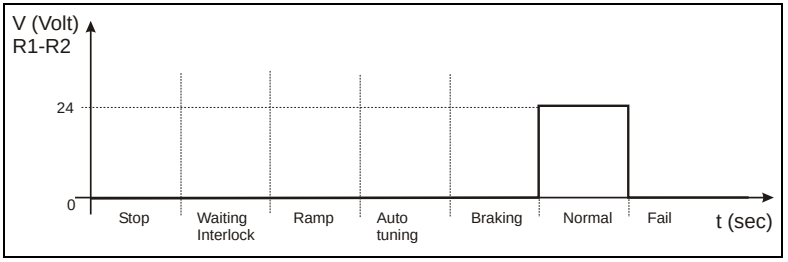



**Figure 17** Diagram 4 – R1 or R2 related to Normal status

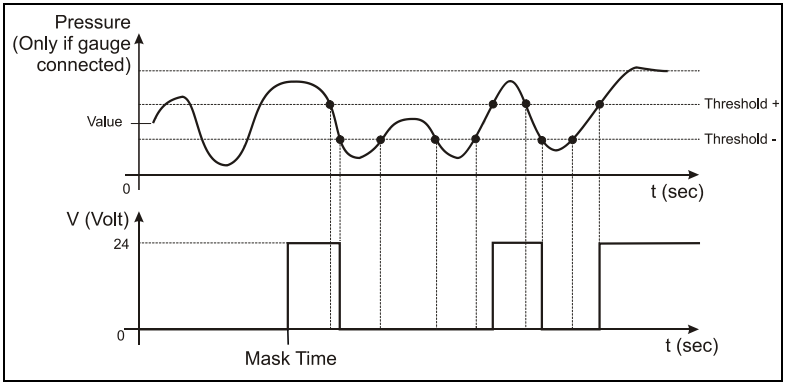



**Figure 18** Diagram 5 – R1 or R2 related to pressure reading (if gauge connected)

# Programmable Analog Output Diagrams

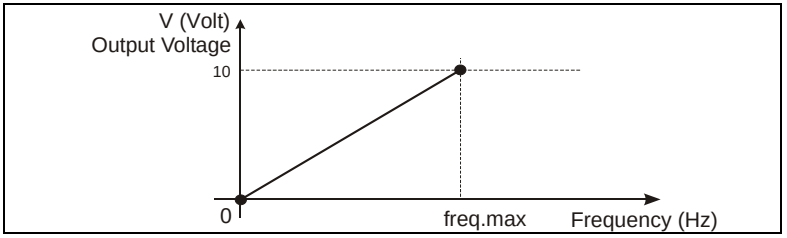



**Figure 19** Diagram 1 – Programmable analog output related to frequency (freq.max = 1010Hz)

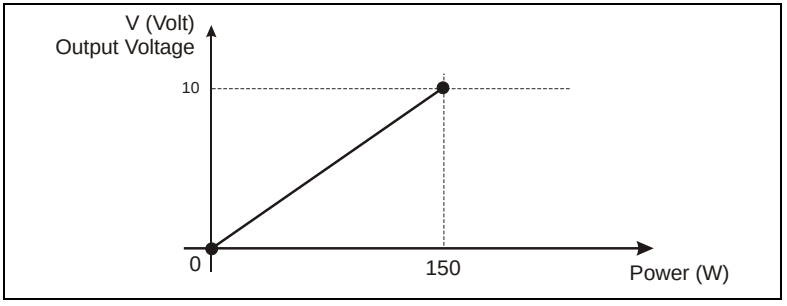



**Figure 20** Diagram 2 – Programmable analog output related to power

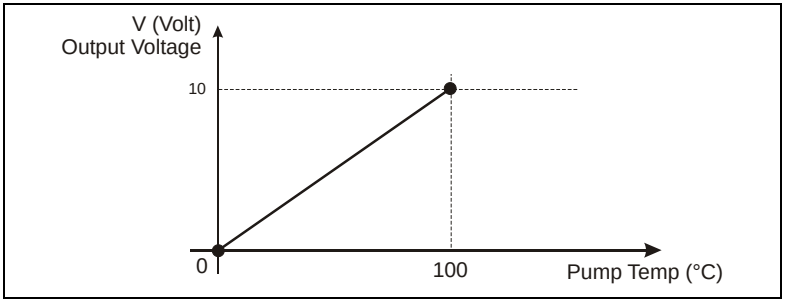



**Figure 21** Diagram 3 – Programmable analog output related to pump temperature

# Pump Connector

A five-meter long cable is available to connect the controller to the pump. The following figure shows the controller output connector configuration where pins:

- **A-F** = pump temperature sensor
- **B-C-D** = 75 Vac 3-phase output to pump motor stator
- **E** = EARTH PROTECTION

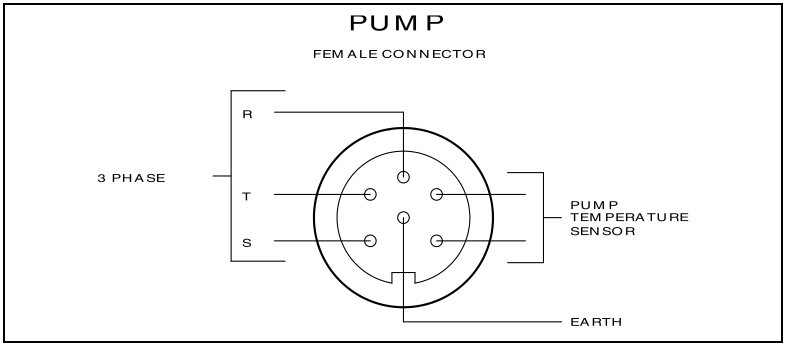



**Figure 22** Controller-to-Pump Connector

# J5 – Gauge Connector

This connector is available to connect the Agilent active gauges.

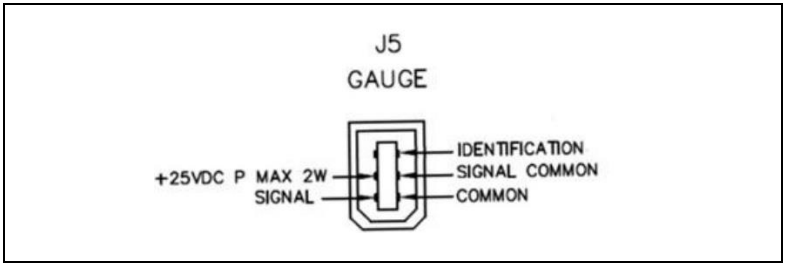



**Figure 23** Gauge Connector

**NOTE** The maximum power provided by controller to drive a gauge is 5W, if your gauge require more power you need an external power supply.

The controller recognizes automatically the gauge connected by reading the signal "identification" in the connector.

Following a table with the gauge supported:

| Gauge model | Name showed in the display |
|---|---|
| FRG 700/702 | FRGa |
| IMG 500 | IMG |
| PVG 500/502 | PVGa |
| CDG 500 T1000 | CDG3 |
| CDG 500 T0100 | CDG2 |
| CDG 500 T0010 | CDG1 |
| CDG 500 T0001 | CDG0 |

The controller give the error "gauge error" if the gauge connected is not supported.

There are some gauges (for example the CDG family gauge) that have the same identification. In this case the controller recognizes the family of the gauge but the user should select the right gauge by front panel.

The pressure can be read by display, by serial line (win. 224) and by Remote I/O (Programmable Analog Out), but the controller doesn't replicate the signal from the gauge.

If the Programmable Analog Output is related to the pressure read by an external gauge, the controller doesn't replicate exactly the signal coming from the gauge; the controller converts the gauge signal in the range from 0 to 10V.

The conversion formula is the following:

$$V_{out} = \frac{V_g - V_{g\_min}}{V_{g\_max} - V_{g\_min}} \times 10$$

Where:

$V_g$ is the gauge output voltage;

$V_{out}$ is the Analog Output voltage;

$V_{g\_min} \div V_{g\_max}$ is the gauge voltage measuring range. These values can be drawn from the gauge technical specifications or from the following table.

| ID | Gauge Model | Pressure range [mbar] | Vg-min ÷ Vg-max [V] |
|---|---|---|---|
| 1 | CT-100 | 1.33E-2 to 1.01E3 | 1.11 ÷ 8.25 |
| 2 | FRG-700/702 | 5E-9 to 1E3 | 1.82 ÷ 8.6 |
| 3 | IMG-500 | 2E-9 to 1E-2 | 1.8 ÷ 8.5 |
| 4 | PVG-500/502 | 5E-4 to 1E3 | 1.9 ÷ 10 |
| 6 | PCG-750/752 | 5E-5 to 1.5E3 | 0.61 ÷ 10.23 |
| 9 | CDG-500 T1000 | 2.66E+1 to 1.33E3 | 0.2 ÷ 10 |
| 10 | CDG-500 T0100 | 2.66E+0 to 1.33E2 | 0.2 ÷ 10 |
| 11 | CDG-500 T0010 | 2.66E-1 to 1.33E1 | 0.2 ÷ 10 |
| 12 | CDG-500 T0001 | 2.66E-2 to 1.33 | 0.2 ÷ 10 |

When in programmable analog signal you read a voltage below the voltage range (in above table) it means “Error Over range”, if you read a voltage below the voltage range it means “Error Under range” (in these cases you can read the manual of the gauge for further details).

With the serial communication you can use the following windows:

| | |
|---|---|
| Win 224 | Pressure reading with the format X.X E XX |
| Win 257 | Gauge status (read only):<br>0 → when a gauge is not connected<br>1 → when a gauge is connected<br>2 → when the pressure read is under range or when the gauge gives an internal error<br>3 → when the pressure read is under range or when the gauge gives an internal error<br>4 → when the “identification” is present but not known by the controller |
| Win 267 | Gauge power (read/write):<br>If you need to turn off the gauge at certain condition you can use this window<br>0 → gauge off<br>1 → gauge on (default)<br>2 → gauge normally off. It turns on when the set point 1 is activated. If the set point 1 type (win 101) is selected as “pressure” the gauge is always on.<br>3 → gauge normally off. It turns on when the set point 1 is activated. If the set point 2 type (win 171) is selected as “pressure” the gauge is always on.<br>4 → gauge normally off. It turns on when the set point 1 is activated. If the set point 3 type (win 101) is selected as “pressure” the gauge is always on. |

The windows from 136 to 140 manage an additional set point (set point 3) dedicated to turn ON or OFF the gauge (win 267=4)

# Pump Driving

Typical pump driving chart start and normal operation.

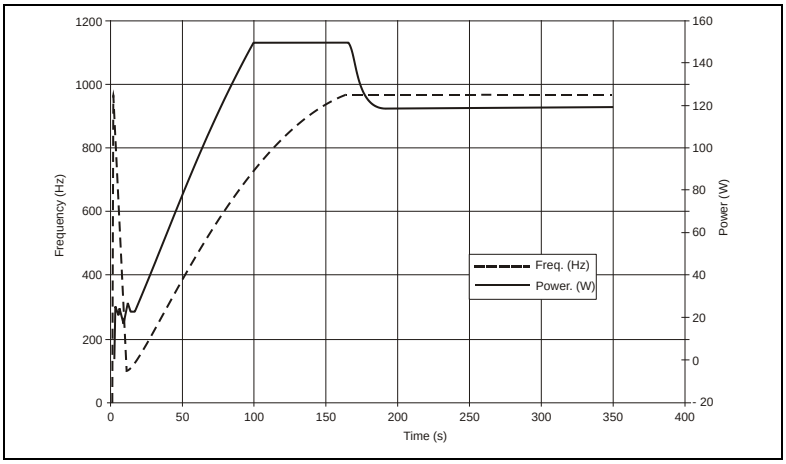



**Figure 24** Diagram 4

# Stop Speed Reading and Active Stop

This function can be activated by Front Panel or serial line (Win 107, 167).

Active Stop brakes the pump using the motor. The Stop Speed reading reads the pump speed after a stop command.

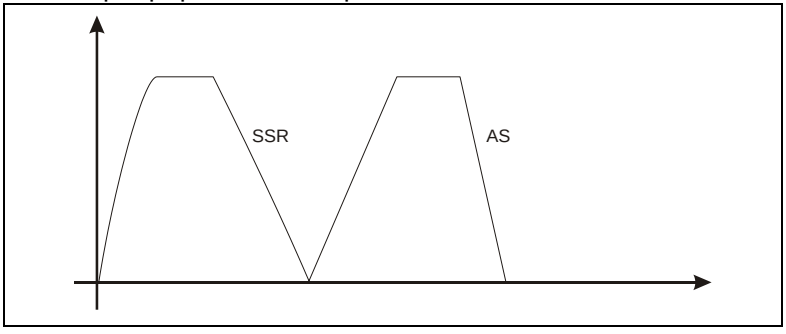



**Figure 25** Diagram 5

# J2 – Serial Connector

This connector provides the connection for RS – 232 and RS – 485 serial line.

J2 Pin-out:

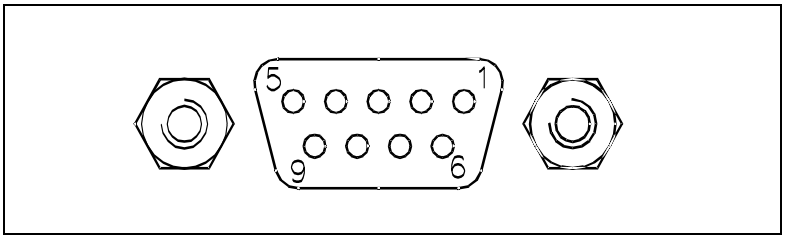



**Figure 26** J2 Connector

**Tab. 5**

| PIN N. | SIGNAL NAME |
|---|---|
| 1 | +5 V (OUT) (Reserved) |
| 2 | TX (RS232 |
| 3 | RX (RS232 |
| 4 | NC |
| 5 | GND |
| 6 | A + (RS485) |
| 7 | NC |
| 8 | B – (RS485) |
| 9 | RESERVED |

# Vacuum Link App

The Remote Controller can communicate with a smartphone connecting the accessory RS232 Serial to B/T Adapter (X3514-68003) to the serial port.

This accessory is a dongle to convert the serial communication to bluetooth communication.

In order to establish the communication between the controller and a smartphone, the Vacuum Link app must be installed first from Google Play or Apple Store. The app is available for both Android and iOS. Once installed, you can establish the connection. Using this app you will be able to read and write all controller parameters.

# Connector Examples

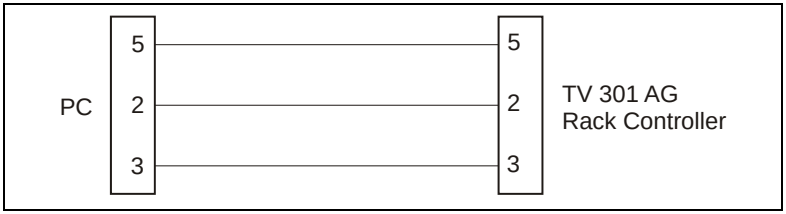



**Figure 27** RS – 232 Connection

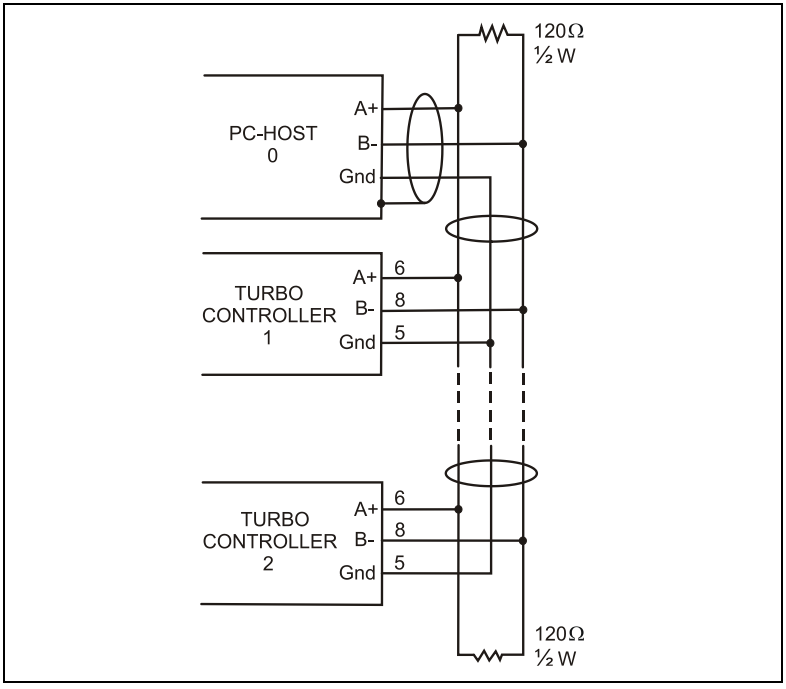



**Figure 28** RS – 485 Connection

The communication port mating connector is supplied with the RS 232 PCB (AMP/Cannon or equivalent 15-pin "D" type male connector). For example, the Transmit data signal from controller (pin 2) must be connected to the host computer's receive data line (pin 2) and vice versa. Consult the host computer's instruction manual for its serial port connections.

**NOTE** Agilent cannot guarantee compliance with FCC regulations for radiated emissions unless all external wiring is shielded, with the shield being terminated to the metal shroud on the 0-subconnector. The cable should be secured to the connector with screws.

# Serial Communication Descriptions

This unit can comunicate by two different protocol:

- protocol (old system) “letter”
- “Window” protocol (new system)

These two protocols can be used as well with 232 or 485 media.

**NOTE** Please use “Window” protocol for new development.

# Letter Protocol Description

The default protocol is “Window”

Communication format:

- 8 data bit
- no parity
- 1 stop bit
- The baud rate is programmable via front panel from 600 to 9600 baud. The controller is factory-set for 9600 baud operation.

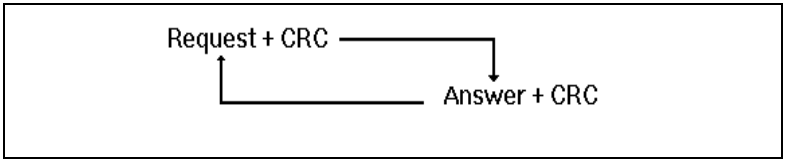
Communication protocol:

Host = Master

Controller = Slave

The communication is performed in the following way:

Host Controller




**Request** is an ASCII character identifying the action that must be performed by the controller or the requested information.

Allowed ASCII characters:

- "A" = START
- "B" = STOP
- "C" = Low Speed ON
- "D" = Low Speed OFF
- "E" = Request for operational parameters
- "F" = Pump times zeroing
- "G" = Parameters reading

- "H" = Parameters writing
- "I" = Request for operating status
- "J" = Request for numerical reading
- "K" = Request for counters reading.

CRC corresponds to the sum (with inverted sign) of all the preceding bytes.

e.g., the START command "A" in ASCII code = 41 inverted it will be: FF + 1 - 41 = BF.

**Tab. 6**

| CHARACTER | ASCII | CONVERTED ASCII FOR CRC CALCULATION |
|---|---|---|
| "A" | 41h | - |
| CRC | - | BFh |
| "B" | 42h | - |
| CRC | - | BEh |
| "C" | 43h | - |
| CRC | - | BDh |
| "D" | 44h | - |
| CRC | - | BCh |
| "E" | 45h | - |
| CRC | - | BBh |
| "F" | 46h | - |
| CRC | - | BAh |
| "G" | 47h | - |
| CRC | - | 89h |
| "H" | 48h | - |
| "I " | 49h | - |
| CRC | - | B7h |
| "J" | 4Ah | - |
| CRC | - | B6h |
| "K" | 4Bh | - |

| CHARACTER | ASCII | CONVERTED ASCII FOR CRC CALCULATION |
|---|---|---|
| CRC | - | B5h |
| "ACK" | 06h | - |
| CRC | - | FAh |
| "NACK" | 15h | - |
| CRC | - | EBh |

**Answer** = after a request from the host, the Controller will answer in one of the following ways:

- ACK
- NACK
- Message

When the Request is "A, "B", "C", "D", "F" the Controller will Answer the ACK or NACK.

When the Request is "E, the **Answer** will contain the complete set of the following parameters:

**Tab. 7**

| BYTES | MEANING |
|---|---|
| 1<br>MSB LSB<br>- - X X X | 0 = STOP<br>1 = WAITING INTERLOCK<br>2 = STARTING<br>3 = NORMAL OPERATION<br>4, 5 = HIGH LOAD<br>6 = FAILURE<br>7 = APPROACHING LOW SPEED |
| 2÷5 | Cycle Time |
| 6÷9 | Pump Life |
| 10÷11 | Pump Temperature |
| 12 | Current* |
| 13 | Voltage* |
| 14÷17 | Frequency |
| 18÷19 | Cycle # |
| 20 | R1 Status |
| 21 | R2 Status |
| 22 | CRC |

*The values for current and voltage are given as numbers, scaled from 0 to 255, where 0 corresponds to 0 V and 255 to the full scale voltage (130 V) or current (2,5 A).

When the **Request** is "G", the **Answer** will contain a string of 11 characters with the following parameters:

**Tab. 8**

| BYTES | MEANING |
|---|---|
| 1-2 | Pump cycles number (integer coded in 2 bytes) |
| 3 | Speed threshold |
| 4-7 | Run up time in seconds (long coded in 4 bytes) |
| 8 | Deat time (0 = NO 1 = YES) |
| 9 | Reserved |
| 10 | Soft Start mode (0 = NO 1=YES) |
| 11 | CRC |

When the configuration parameters have to be changed, send a **Request** string with "H" characters of the following type:

"H" + .... data .... + CRC

The following parameters can be changed:

**Tab. 9**

| BYTES | MEANING |
|---|---|
| 1 | Speed threshold |
| 2-5 | Run up time in seconds (long coded in 4 bytes) |
| 6 | Deat time (0 = NO 1 = YES) |
| 7 | Reserved |
| 8 | Soft Start mode (0 = YES 1 = NO) |
| 9 | CRC |

When the **Request** is "I" (Status readings), the **Answer** will contain a string of 2 characters with the following parameters:

**Tab. 10**

| BYTES | MEANING |
|---|---|
| 1<br>MSB LSB<br>- - X X X X X X | 0 = STOP<br>1 = WAITING INTERLOCK<br>2 = STARTING<br>3 = NORMAL OPERATION<br>4,<br>6 = FAILURE<br>7 = APPROACHING LOW SPEED<br>R2 status 0 = OFF 1 = ON<br>R1 status 0 = OFF 1 = ON |
| 2 | CRC |

When the **Request** is "J" (Numerical readings), the **Answer** will contain a string of 5 characters with the following parameters:

**Tab. 11**

| BYTES | MEANING |
|---|---|
| 1 | Current (0-255 scaled) |
| 2 | Voltage (0-255 scaled) |
| 3 | Rotational speed KRPM |
| 4 | Pump temperature °C (0-254 temperature reading, 255 = fail) |
| 5 | CRC |

When the **Request** is "K" (Counters readings), the **Answer** will contain a string of 11 characters with the following parameters:

**Tab. 12**

| BYTES | MEANING |
|---|---|
| 1-4 | Cycle time |
| 5-8 | Pump life |
| 9-10 | Cycle number |
| 11 | CRC |

On request a sample program in QBasic language is available by Agilent.

# Window Protocol

## Description

**Communication Format**

- 8 data bit
- no parity
- 1 stop bit
- baud rate: 600/1200/2400/4800/9600 programmable

## Communication Protocol

The communication protocol is a MASTER/SLAVE type where:

- Host = MASTER
- Controller = SLAVE

The communication is performed in the following way:

1 the host (MASTER) send a MESSAGE + CRC to the controller (SLAVE);

2 the controller answer with an ANSWER + CRC to the host.

The MESSAGE is a string with the following format:

<STX>+<ADDR>+<WIN>+<COM>+<DATA>+<ETX>+<CRC>

Where:

**NOTE** When a data is indicated between two quotes ('...') it means that the indicated data is the corresponding ASCII character.

<STX> (Start of transmission) = 0x02

<ADDR> (Unit address) = 0x80 (for RS 232)

<ADDR> (Unit address) = 0x80 + device number (0 to 31)
(for RS 485)

<WIN> (Window) = a string of 3 numeric character indicating the window number (from '000' to '999'); for the meaning of each window see the relevant paragraph.

<COM> (Command) = 0x30 to read the window, 0x31 to write into the window

<DATA> = an alphanumeric ASCII string with the data to be written into the window. In case of a reading command this field is not present. The field length is variable according to the data type as per the following table:

**Tab. 13**

| Data Type | Field Length | Valid Characters |
|---|---|---|
| Logic (L) | 1 | '0' = OFF<br>'1' = ON |
| Numeric (N) | 6 | '-', '.', '0' . . . '9' right justified with '0' |
| Alphanumeric (A) | 10 | from blank to '_' (ASCII) |

<ETX> (End of transmission) = 0x03

<CRC> = XOR of all characters subsequent to <STX> and including the <ETX> terminator. The value is hexadecimal coded and indicated by two ASCII character.

The addressed SLAVE will respond with an ANSWER whose structure depends from the MESSAGE type. When the MESSAGE is a reading command, the SLAVE will respond transmitting a string with the same structure of the MESSAGE.

**NOTE** Using the RS 485 interface, the message structure remains identical to the one used for the RS 232 interface, the only difference being that the value assigned to the ADDRESS <ADDR>

The controller can answers with the following response types:

**Tab. 14**

| Response Type | Response Length | Response Value | Description |
|---|---|---|---|
| Logic | 1 byte | - | after a read instruction of a logic window |
| Numeric | 6 bytes | - | after a read instruction of a numeric window |
| Alphanumeric | 10 bytes | - | after a read instruction of an alphanumeric window |
| ACK | 1 byte | (0x6) | the command execution has been successfully completed |
| NACK | 1 byte | (0x15) | the command execution has been failed |
| Unknown Window | 1 byte | (0x32) | the specified window in the command is not a valid window |
| Data Type Error | 1 byte | (0x33) | the data type specified in the command (Logic, Numeric or Alphanumeric) is not accorded with the specified Window |
| Out of Range | 1 byte | (0x34) | the value expressed during a write command is out of the range value of the specified window |
| Win Disabled | 1 byte | (0x35) | the specified window is Read Only or temporarily disabled (for example you can't write the Soft Start when the Pump is running) |

# Examples

**Command: START**
Source: PC
Destination: Controller

| 02 | 80 | 30 | 30 | 30 | 31 | 31 | 03 | 42 | 33 |
|---|---|---|---|---|---|---|---|---|---|
| STX | ADDR | WINDOW | | | WR | ON | ETX | CRC | |

Source: Controller
Destination: PC

| 02 | 80 | 06 | 03 | 38 | 35 |
|---|---|---|---|---|---|
| STX | ADDR | ACK | ETX | CRC | |

**Command: STOP**
Source: PC
Destination: Controller

| 02 | 80 | 30 | 30 | 30 | 31 | 30 | 03 | 42 | 32 |
|---|---|---|---|---|---|---|---|---|---|
| STX | ADDR | WINDOW | | | WR | OFF | ETX | CRC | |

Source: Controller
Destination: PC

| 02 | 80 | 06 | 03 | 38 | 35 |
|---|---|---|---|---|---|
| STX | ADDR | ACK | ETX | CRC | |

**Command: SOFT-START (ON)**
Source: PC
Destination: Controller

| 02 | 80 | 31 | 30 | 30 | 31 | 31 | 03 | 42 | 32 |
|---|---|---|---|---|---|---|---|---|---|
| STX | ADDR | WINDOW | | | WR | ON | ETX | CRC | |

Source: Controller
Destination: PC

| 02 | 80 | 06 | 03 | 38 | 35 |
|---|---|---|---|---|---|
| STX | ADDR | ACK | ETX | CRC | |

**Command: SOFT-START (OFF)**
Source: PC
Destination: Controller

| 02 | 80 | 31 | 30 | 30 | 31 | 30 | 03 | 42 | 33 |
|---|---|---|---|---|---|---|---|---|---|
| STX | ADDR | WINDOW | | | WR | OFF | ETX | CRC | |

Source: Controller
Destination: PC

| 02 | 80 | 06 | 03 | 38 | 35 |
|---|---|---|---|---|---|
| STX | ADDR | ACK | ETX | CRC | |

**Command: READ PUMP STATUS**
Source: PC
Destination: Controller (with address = 3)

| 02 | 83 | 32 | 30 | 35 | 30 | 03 | 38 | 37 |
|---|---|---|---|---|---|---|---|---|
| STX | ADDR | WINDOW | | | RD | ETX | CRC | |

Source: Controller (with address = 3 in stop status)
Destination: PC

| 02 | 83 | 32 | 30 | 35 | 30 | 30 | 30 | 30 | 30 | 30 | 03 | 38 | 37 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| STX | ADDR | WINDOW | | | DATA (STATUS) | | | | | | ETX | CRC | |

**Command: REAL SERIAL TYPE**
Source: PC
Destination: Controller (with address = 3 in 485 mode)

| 02 | 83 | 35 | 30 | 34 | 30 | 03 | 38 | 31 |
|---|---|---|---|---|---|---|---|---|
| STX | ADDR | WINDOW | | | RD | ETX | CRC | |

Source: Controller
Destination: PC

| 02 | 83 | 35 | 30 | 34 | 30 | 31 | 03 | 42 | 30 |
|---|---|---|---|---|---|---|---|---|---|
| STX | ADDR | WINDOW | | | RD | DATA | ETX | CRC | |

# Window Meanings

**Tab. 15**

| WIN# | READ/ WRITE | TYPE | MEANING | ADMITTED VALUES | FACTORY SET |
|---|---|---|---|---|---|
| 0 | R/W | L | Start/Stop (in remote/ Front mode the window is a read only) | Start = 1<br>Stop = 0 | 0 |
| 1 | R/W | L | Low Speed Activation | No = 0<br>Yes = 1 | 0 |
| 8 | R/W | A/L | Serial/Remote/Front/FieldBus Contr.Configuration | 0 = Serial<br>1 = Remote<br>2 = Front<br>3 = Profibus | 1 |
| 100 | R/W | L | Enable/Disable Soft Start<br>(write only in Stop condition) | Enable = 1<br>Disable = 0 | "1" at the first START, then "0" |
| 101 | R/W | N | R1 Set Point type | 0 = Freqency<br>1 = Power<br>2 = Time<br>3 = Normal<br>4 = Pressure (available only if the gauge is connected) | 3 |
| 102 | R/W | N | R1 Set Point value<br>(expressed in Hz/W/s/mbar) | 0¸999999 | 867 |
| 103 | R/W | N | R1 Set Point delay: time between the pump start and the set point check (seconds) | 0¸999999 | 0 |
| 104 | R/W | L | R1 Set Point signal activation type: the signal can be "high level active" or "low level active"; "high level active" indicates the output is ON when the signal is above the threshold | 0 = high level active<br>1 = low level active | 0 |
| 105 | R/W | N | R1 Set point hysteresis<br>(in % of R1 value) | 0¸100 | 2 |
| 107 | R/W | L | Active Stop (write only in stop)<br>Enable/disable the stop with active braking. | Enable = 1<br>Disable = 0 | 0 |
| 108 | R/W | N | Serial comm. baud rate | 0 = 600 bit/s<br>1 = 1200 bit/s<br>2 = 2400 bit/s<br>3 = 4800 bit/s<br>4 = 9600 bit/s | 4 |
| 109 | W | L | Pump life/Cycle time/Cycle number reset | To reset write '1' | |
| 110 | R/W | L | Interlock type.<br>The interlock can be checked at start (impulse) or continuously | Impulse = 0<br>Continuous = 1 | 0 |

| WIN# | READ/ WRITE | TYPE | MEANING | ADMITTED VALUES | FACTORY SET |
|---|---|---|---|---|---|
| 111 | R/W | N | Analog output type: output voltage signal proportional to frequency, power, temperature or pressure | 0 = frequency<br>1 = power<br>2 = Temperature<br>3 = Pressure | 1 |
| 117 | R/W | N | Low Speed frequency value (Hz) | from 700 to 1010 Hz | 700 |
| 120 | R/W | N | Rotational frequency setting (Hz) | from low speed frequency (win 117) to 1010 Hz | 1010 |
| 122 | R/W | L | Set vent valve (on/off)<br>(write if Win125 = 1) | On = 1<br>Off = 0 | 1 |
| 123 | | | Reserved to Agilent Service | | |
| 124 | | | Reserved to Agilent Service | | |
| 125 | R/W | A/L | Set the vent valve operation | 0 = Automatic<br>1 = On command<br>2 = Auto pump speed | 0 |
| 126 | R/W | N | Vent valve opening delay (1unit = 0.2s) | 0¸65535<br>(from 0 to 13107s) | 15 |
| 130 | | | Reserved to Agilent Service | | |
| 136 | R/W | N | Gauge Set Point Type | 0 = Freqency<br>1 = Power<br>2 = Time<br>3 = Normal | 3 |
| 137 | R/W | N | Gauge Set Point Value (Hz/W/s/mbar) | 0¸999999 | 867 |
| 138 | R/W | N | Gauge Set Point delay: time (s) between the pump<br>start and the set point check (seconds) | 0¸999999 | 0 |
| 139 | R/W | L | Gauge Set Point Signal Activation Type the signal can be "high level active" or "low level active"; "high level active" indicates the output is ON when the signal is above the threshold | 0 = high level active<br>1 = low level active | 0 |
| 140 | R/W | N | Gauge Set point hysteresis (in % of gauge set point value) | 0¸100 | 2 |
| 143 | R/W | N | External fan configuration | 0 = Always On<br>1 = Controlled by Serial | 0 |
| 144 | R/W | L | External fan activation | On = 1<br>Off = 0 | 0 |
| 147 | R/W | N | Vent valve opening time (1unit = 0.2s; 0 = infinite)<br>(Ref. to “vent connector” paragraph) | 0¸65535 (from 0 to 13107s) | 0 |
| 155 | R | N | Actual maximum power limit (W)<br>(It reads the maximun power deliverable to the pump) | | |

| WIN# | READ/ WRITE | TYPE | MEANING | ADMITTED VALUES | FACTORY SET |
|---|---|---|---|---|---|
| 157 | R/W | N | Gas load type<br>(it sets the gas type to be used with the pump) | 0 = Ar<br>1 = N2<br>2 = He | 0 |
| 162 | R | A | R1 Set Point Pressure Threshold<br>Data format: X.X EsXX<br>(with X = 0 to 9; s = + or -)<br>Threshold value is meaningful if win101 = 4 | | |
| 163 | R/W | N | Unit of measure for pressure | 0 = mbar<br>1 = Pascal<br>2 = Torr | 0 |
| 167 | R/W | L | Stop Speed Reading<br>Enables/Disables the reading of the pump speed after a stop command | Enable = 1<br>Disable = 0 | 0 |
| 171 | R/W | N | R2 Set Point Type | 0 = Freqency<br>1 = Power<br>2 = Time<br>3 = Normal<br>4 = Pressure (available only if the gauge is connected) | 3 |
| 172 | R/W | N | R2 Set Point value (expressed in Hz/W/s/mbar) | 0¸999999 | 867 |
| 173 | R/W | N | R2 Set Point delay: time between the pump start and the set point check (seconds) | 0¸999999 | 0 |
| 174 | R/W | L | R2 Set Point signal activation type: the signal can be "high level active" or "low level active"; "high level active" indicates the output is ON when the signal is above the threshold | 0 = high level active<br>1 = low level active | 0 |
| 175 | R/W | N | R2 Set point hysteresis (in % of R2 value) | 0¸100 | 2 |
| 176 | R | A | R2 Set Point Pressure Threshold<br>Data format: X.X EsXX (with X = 0 to 9; s = + or -)<br>Threshold value is meaningful if win101 = 4 | | |
| 177 | R/W | L | Start Output Config. | 0 = Starting (Output ON only with pump Status = Starting)<br>1 = Running<br>(Output ON when the pump is running) | 0 |

| WIN# | READ/ WRITE | TYPE | MEANING | ADMITTED VALUES | FACTORY SET |
|---|---|---|---|---|---|
| 181 | R/W | N | Gauge Gas Type | 0 = Not configured<br>1 = Nitrogen<br>2 = Argon<br>3 = Hydrogen<br>4 = Other | 0 |
| 182 | R/W | N | Correction Factor for Custom Gauge | 10,999 | |
| 200 | R | N | Pump current (mA dc); it reads the actual value of the bus current supplied by controller to electric motor | | |
| 201 | R | N | Pump voltage (Vdc); it reads the actual value of the peak 3ph.voltage supplied by controller to the electric motor | | |
| 202 | R | N | Pump power (W); it reads the actual value of power supplied by controller to electric motor | | |
| 203 | R | N | Driving frequency (Hz) | | |
| 204 | R | N | Pump temperature (°C) | | |
| 205 | R | N | Pump status | 0 = Stop<br>1 = Interlock<br>2 = Ramp<br>3 = Autotuning<br>4 = Braking<br>5 = Normal<br>6 = Fail | |
| 206 | R | N | Error code ($2^x$) | (bit description)<br>7 = Too High Load<br>6 = Short Circuit<br>5 = Over Voltage<br>4 = Override<br>3 = Run Up time<br>2 = Controller Over Temp<br>1 = Pump Over Temp<br>0 = No connection to pump | |
| 211 | R | N | Controller heatsink temperature (°C) | | |
| 216 | R | N | Controller cooling air temperature (°C) | | |
| 224 | R | N | Pressure reading<br>Format = X.X E XX | | |
| 226 | R | N | Rotation Frequency (rpm) | | |
| 257 | R | N | Gauge Status | 4 = RidUnknown<br>3 = GaugeOverRange<br>2 = GaugeUnderRange<br>1 = GaugeConnected<br>0 = NoGaugeConnected | |

| WIN# | READ/ WRITE | TYPE | MEANING | ADMITTED VALUES | FACTORY SET |
|---|---|---|---|---|---|
| 267 | R/W | N | Gauge Power Mode | 4 = Power On Set Point 3<br>3 = Power On Set Point 2<br>2 = Power On Set Point 1<br>1 = Power On Always<br>0 = No Power | |
| 300 | R | N | Cycle time in minutes; it indicates the time of the last cycle (from the last start to the current time, if the pump is running) | 0,999999 | |
| 301 | R | N | Cycle number; it indicates the number of cycles start/stop during the whole pump life. | 0,9999 | |
| 302 | R | N | Pump life in hours | | |
| 320 | | | Reserved to Agilent Service | | |
| ... | | | Reserved to Agilent Service | | |
| 399 | | | Reserved to Agilent Service | | |
| 400 | R | A | Program Listing CRC | | |
| 402 | R | A | Parameter Listing CRC | | |
| 404 | R | A | Parameter Listing Struct.CRC | | |
| 500 | | | Reserved to Agilent Service | | |
| 503 | R/W | N | RS485 address | 0,31 | |
| 504 | R/W | L | Serial type selection | 0 = RS232<br>1 = RS485 | 0 |
| 724 | R/W | N | Run Up time (minutes) | 0,30 | 15 |
| 725 | R/W | L | Run Up time control | On = 1<br>Off = 0 | 1 |

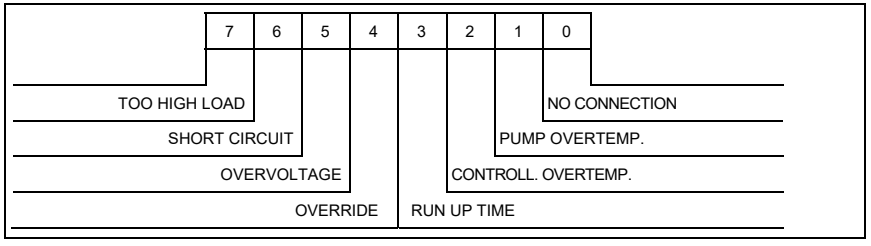



**Figure 29** Window N. 206 Bit Description

# How to Use by Front Panel

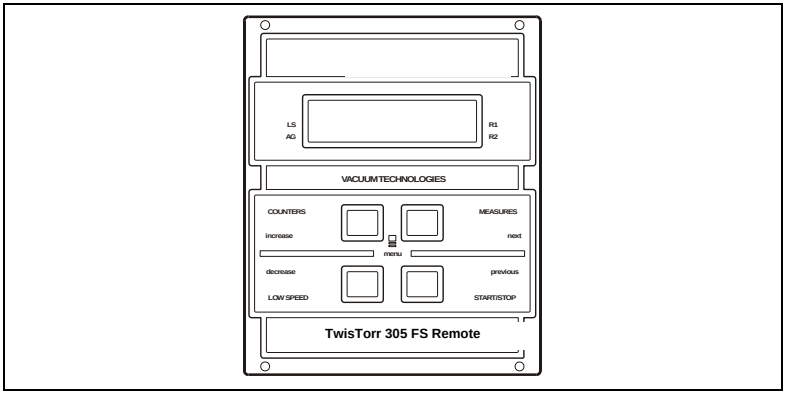



**Figure 30**

- **Start Stop and Reset Fail button**
  Press once for the START command and again for the STOP command. In the case of controller's failure, press once to reset the fail condition.

**NOTE** The front panel START/STOP function is available only if the controller is set to "FRONT mode". If it is set to "REMOTE mode", when the key is pressed an error message is shown indicating "COMMAND LOCKED IN REMOTE", if it is set to "SERIAL" mode, the "COMMAND LOCKED IN SERIAL MODE" error message is displayed. The "Reset Fail" function is always available regardless of controller mode.

---

- **Low Speed**
  Press once to activate the LOW SPEED command; press again to de-activate.

**NOTE** The front panel LOW SPEED function is available only if the controller is set to "FRONT"; otherwise an error message is returned. If it is set to "REMOTE" mode, the COMMAND LOCKED IN REMOTE error message is displayed while if it is in "SERIAL" mode the "COMMAND LOCKED IN SERIAL MODE" error message is returned.

---

- **Counters**
  Pressing the first time on the display, the following information is displayed:

| | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | C | Y | C | L | E | | X | X | X | X | | | |
| | | T | I | M | E | | | X | X | X | X | X | m | | |

Where:

**CYCLE** XXXX Number of start/stop cycles

**TIME** XXXXXm Time of last cycle (minutes)

Pressing a second time, the following is displayed:

| | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | P | U | M | P | | L | I | F | E | | | | |
| | | | | X | X | X | X | X | X | h | | | | | |

**PUMP LIFE**

**XXXXXX** total operating time (hours) of the pump

Pressing a third time, the following message Is displayed:

| | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | M | N | : | | X | X | X | X | X | X | X | X | X | X | |
| | S | N | : | | Y | Y | Y | Y | Y | Y | Y | Y | Y | Y | |

**MN** Model Number of the controller

**SN** Serial Number

On pressing the key again, the main screen page is redisplayed.

- **Measures**
  Pressing once, the following is obtained:

| | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| P | = | X | X | X | W | | | | | X | X | X | X | H | z |
| | | | | | T | = | X | X | ° | C | | | | | |

Where:

**P = XXX W** is the current power supplied to the pump

**T = XX °C** is the current temperature of the pump

**XXXX Hz** is the current frequency of rotation of the pump. This value is set by default to 1010 Hz but can be modified by the user according to needs, proceeding as described in the "PROGRAMMING" paragraph. The unit of measurement (HZ / Krpm, default = Hz) is selected by the user from the INPUT/OUTPUT->SPED menu.

If the SOFT-START function (PUMP SETTING menu → SOFTSTART is active and the pump is ramping, indication of the speed of rotation is replaced with a bar-graph that indicates the soft-start step in course and the total number of steps to be performed. On completion of the soft-start ramp, the bar-graph is replaced with indication of the frequency of rotation of the pump

Pressing twice, the following is obtained:

| | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| N | O | R | M | A | L | | | | | X | X | X | X | H | z |
| | I | = | X | . | X | X | A | | V | = | X | X | X | V | |

Where:

**NORMAL**: indicates the operating regime of the pump

**XXXHz:** see description "Pressing once" **Measures** key

**I=X.XXA**: indicates the current absorbed by the pump

**V= XXX V**: indicates the pump driving voltage

Pressing 3 times, the following is obtained:

| | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| P | = | X | X | X | W | | | | | X | X | X | X | H | z |
| | | X | . | X | X | E | - | Y | Y | m | B | a | R | | |

| | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| X | . | X | E | - | Y | Y | m | B | a | r | | Z | Z | Z | Z |
| | P | = | X | X | X | W | | | X | X | X | X | H | z | |

Where:

**P= XXXW**: indicates the current power supplied to the pump

**XXXHz**: see description “Pressing once” **Measures** key

**X.XE-YYmBar:** indicates the pressure currently measured by the gauge.

**ZZZZ**: indicates the kind of gauge (see table of gauge supported in the gauge chapter)

Other possible indications:

| | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| P | = | X | X | X | W | | | | | X | X | X | X | H | z |
| | | G | A | U | G | E | | E | R | R | O | R | | | |

Where:

**GAUGE_ERROR**: gauge not connected or broken

| | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| P | = | X | X | X | W | | | | | X | X | X | X | H | z |
| | P | R | E | S | S | U | R | E | | U | N | D | E | R | |

Where:

**PRESS UNDER:** indicates that the pressure read is below the minimum measurement threshold set (5 E-9 mBar)

| | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| P | = | X | X | X | W | | | | | X | X | X | X | H | z |
| | P | R | E | S | S | U | R | E | | O | V | E | R | | |

Where:

**PRESS OVER**: indicates that the pressure measured is above the maximum measurement threshold set (1000 mBar)

The unit of measurement of the pressure can be selected (GAUGE menu→Unit) from “mBar”,”Pa”,”torr”

Pressing 4 times returns to the following screen page:

| | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **N** | **O** | **R** | **M** | **A** | **L** | | | | | **X** | **X** | **X** | **X** | **H** | **z** |
| | **X** | **X** | **X** | **X** | **X** | **X** | **X** | **X** | **X** | **X** | **X** | **X** | **X** | **X** | |

Where:

**NORMAL**: indicates the operating regime of the pump

**XXXHz**: see description “Pressing once” **Measures** key

The operating mode of the controller is shown at the bottom in the center. This may be:

**FRONT**: front mode (the controller accepts START/STOP and LOW SPEED commands from the front panel)

**REMOTE**: remote mode (the controller accepts START/STOP and LOW SPEED commands via the rear connector)

**RS232**: the controller accepts commands from the serial port according to the RS232 standard.

**RS485 [XX]:** the controller accepts commands from the serial port in RS485 mode with address XX (XX from 0 to 31)

**PROFIBUS [YYY]:** the controller accepts commands from the PROFIBUS port with address YYYY

Black rectangles as shown below may be displayed at any time in the first and last box of the bottom line of the display (opposite the LS / AG / R1 / R2 captions). The meaning of these rectangles is as follows:

**LS** → the controller is at LOW SPEED

**AG** → the Gauge is connected to the controller

**R1** → relay (set point) R1 is active

**R2** → relay (set point) R2 is active

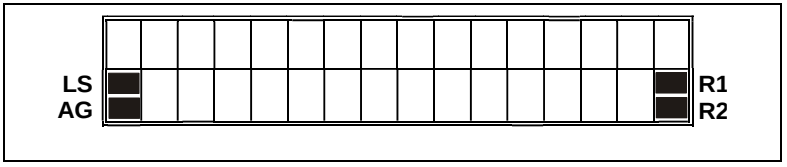



**Figure 31**

# Use

## General

Make all vacuum manifold and electrical connections and refer to TwisTorr 305 FS pump instruction manual before to operating the TwisTorr 305 FS Remote Controller.

**WARNING!**

**To avoid injury to personnel and damage to the equipment, if the pump is laying on a table make sure it is steady. Never operate the TwisTorr 305 FS pump if the pump inlet is not connected to the system or blanked off.**

**NOTE**

The input signal P1 connector should be left in position including the shipping links if no external connections are made.
The forepump and the TwisTorr 305 FS pump can be switched on at the same time.

# Startup

- Plug the controller power cable into a suitable power source.
  The display lights up for approx. 2 seconds and shows:

| | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | A | U | T | O | T | E | S | T | | | | |
| | | | | | | | O | K | | | | | | | |

- After 2 seconds, the display shows the following screen page:

| | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| S | T | O | P | | | | | | | . | . | . | . | H | z |
| | | | | | F | R | O | N | T | | | | | | |

**NOTE** If the pump is not connected, the display will be as follows:

| | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| C | H | E | C | K | | C | O | N | N | E | C | T | I | O | N |
| | | | T | O | | P | U | M | P | | | | | | |

- Pressing the START button, the pump is started and the display shows the following screen page.

| | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| S | T | A | R | T | I | N | G | | | X | X. | X | X | H | z |
| | | | | | F | R | O | N | T | | | | | | |

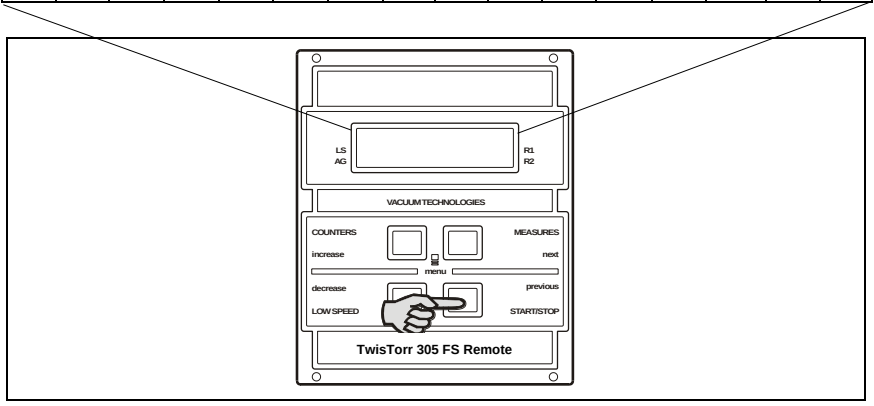



**Figure 32**

This screen page will be visible throughout the acceleration phase the pump. The increasing value of the rotation frequency will be displayed in the boxes marked X; the user may decide to express this value in Hz (default) or in KRMP.

Once operating speed has been reached, the following screen page is displayed:

| | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| N | O | R | M | A | L | | | | | | 9. | 6 | 3 | H | z |
| | | | | | F | R | O | N | T | | | | | | |

If the LOW SPEED key is pressed, the above screen page changes to:

| | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| B | R | A | K | I | N | G | | | | X | X | X | X | H | z |
| | | | | | F | R | O | N | T | | | | | | |

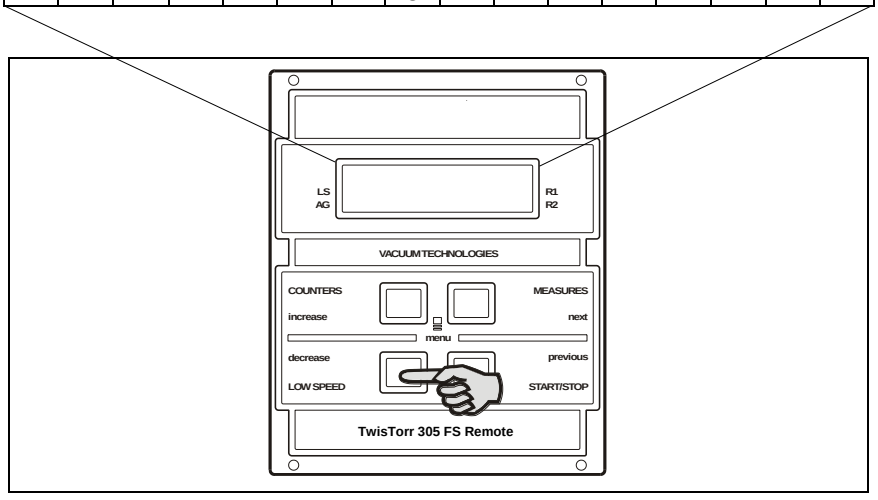



**Figure 33**

The following screen page is displayed on reaching the pre-established speed:

| | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| N | O | R | M | A | L | | | | | | 9 | 0 | 0 | H | z |
| | | | [redacted] | | F | R | O | N | T | | | | | | |

The rotation value set in both NORMAL and LOW SPEED mode can be modified by the user as described in the Programming section of this manual.

- Press the MEASURES push button: the display shows:

| | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| P | = | | 5 | 0 | W | | | | | | 9 | 6 | 3 | H | z |
| | | | | | T | = | 4 | 5 | ° | C | | | | | |

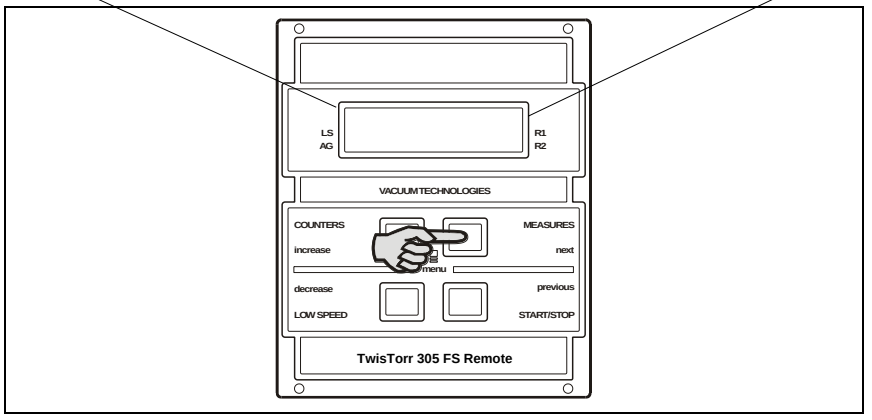



**Figure 34**

Where:

**P** = is the DC power drawn by the pump (range 0 to 999 Watt)

**Hz** = is the rotational speed of the pump as a function of the controller output frequency

**°C** = is the temperature of the outer ring of the upper bearing (range 00 to 99 °C)

- Pressing MEASURES key twice, the following screen page is displayed:

| | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **N** | **O** | **R** | **M** | **A** | **L** | | | | | | **9** | **6** | **3** | **H** | **z** |
| | **I** | **=** | **1** | **.** | **2** | **0** | **A** | | **V** | **=** | | **4** | **2** | **V** | |

Where:

**I** is the current supplied by the controller to the pump at that precise moment.

**V** is the voltage at which the controller is powering the pump at that moment

- Pressing the MEASURES key three times, with the GAUGE connected and functioning, the following screen page is displayed:

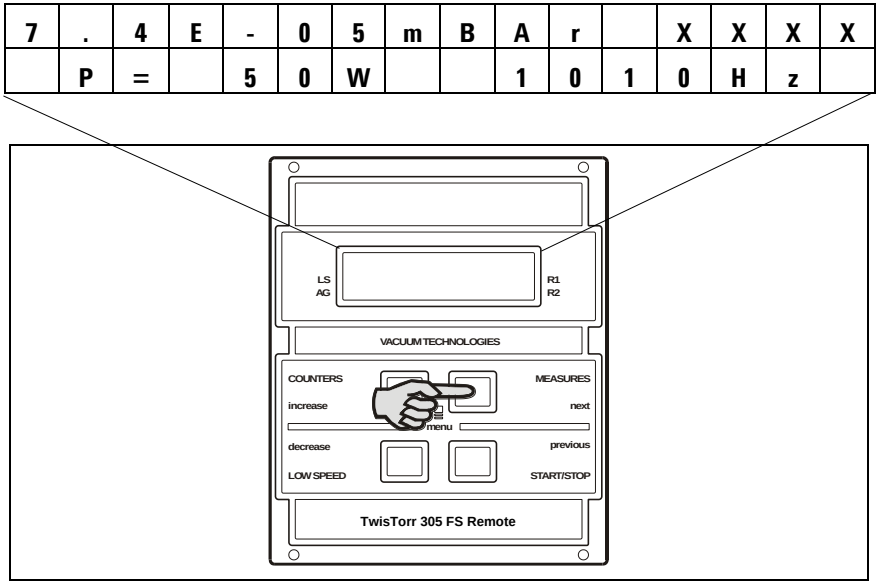



**Figure 35**

Where:

**mBar** shows the pressure value measured

**XXXX** shows the kind of gauge connected

The following messages may be displayed instead of the pressure:

**GAUGE ERROR:** indicates that the GAUGE is not identified

**PRESSURE UNDER:** indicates that a pressure below the minimum threshold set has been measured

**PRESSURE OVER:** indicates that a pressure exceeding the maximum threshold set has been measured

- Pressing the COUNTERS key, the following is obtained:

| | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | C | Y | C | L | E | | X | X | X | X | | | |
| | | T | I | M | E | | | X | X | X | X | X | m | | |

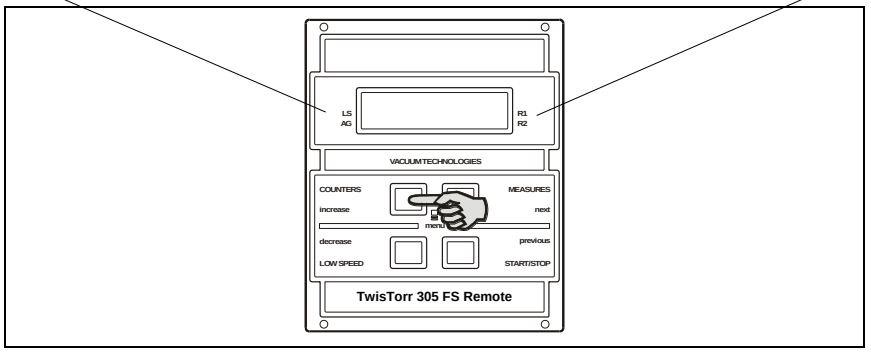



**Figure 36**

Where:

**CYCLE** XXXX Number of start/stop cycles
**TIME** XXXXXm Time of last cycle (minutes)
Pressing again:

| | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | P | U | M | P | | L | I | F | E | | | | |
| | | | | X | X | X | X | X | X | h | | | | | |

Where:

**PUMP LIFE** **XXXXXX** total operating time (hours)of the pump

# Programming

## Configuration Menu

To access the configuration menu, press the COUNTERS + MEASURES buttons at the same time for at least 2 sec.

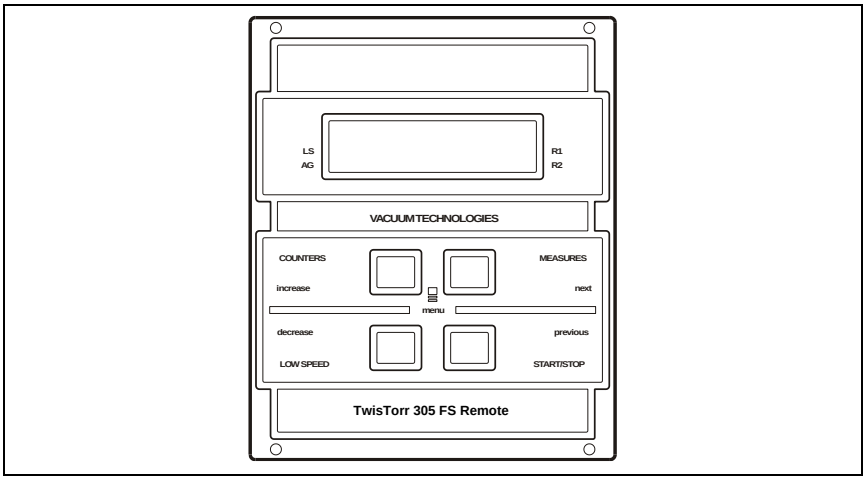



**Figure 37**

In programming mode, the meaning of the 4 buttons changes as follows:

- **COUNTERS/LOW SPEED** speed become "**INCREASE** and **DECREASE**" and make it possible to select the next or previous value of a parameter (in the case of compulsory parameters) or to increase/decrease the individual digit of a parameter (in the case of numeric parameters)
- The "**MEASURES and START/STOP**" buttons become "**NEXT** and **PREVIOUS**" and make it possible to select the next parameter (or next digit of a numeric parameter) or previous parameter.

Switching from one parameter to the next (using the "**NEXT**" key) indicates confirmation of any changes made to the specific parameter. If the changes cannot be accepted by the controller, the **"Data out of limits"** error message is displayed, the changes are cancelled and the value of the parameter prior to the modification is reproposed.

Switching from a parameter to the previous parameter (using the "**PREVIOUS**" key) indicates the intention to abort any changes made to the specific parameter. Abort is indicated by the caption "**Changes aborted**" that is displayed for approx. 1 second before moving to the previous parameter.

The configuration environment has a tree-like structure and permits "circular" navigation; on reaching the end of a branch, the user is returned automatically to the start of this. Navigation can proceed in a forwards (**NEXT** button) or backwards (**PREVIOUS** button) direction

It is possible to enter a sub-branch by pressing the "**INCREASE**" button. If no buttons are pressed for more than 1 minute, the controller automatically quits the programming environment canceling any modifications made to the current parameter.

The figure below shows the first level of the configuration menu and the links to the respective second level menus (indicated below).

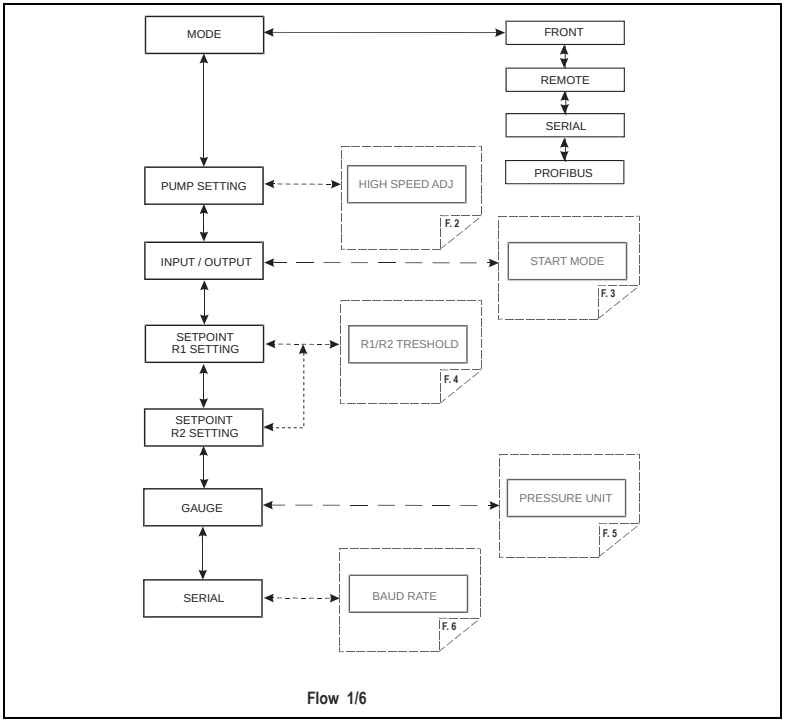



**Figure 38**

# Mode Menu

- **MODE**: permits selection (see Flow 1/6) of the operating mode of the controller from those indicated below:
  - FRONT: accepts commands from the front panel
  - REMOTE: accepts commands from the remote input connector
  - SERIAL: accepts commands from the serial interface (or Profibus interface if present)
  - PROFIBUS: this operating mode is present only if the Profibus interface is installed on the controller

# Pump Setting Menu

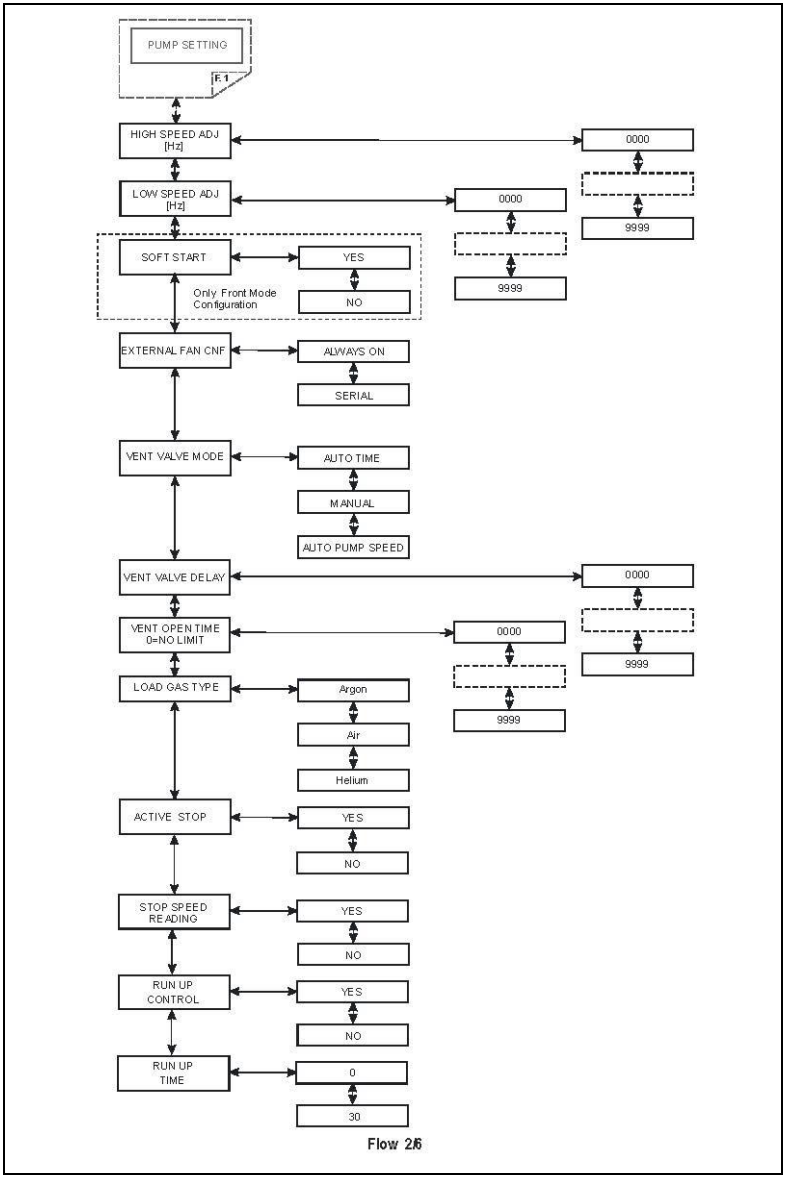



**Figure 39**

This menu contains all the parameters that have a direct effect on driving of the pump.

- **HIGH SPEED**: Sets (in Hz) the speed of rotation of the pump when the low-speed function is not active.
- **LOW SPEED**: Sets (in Hz) the speed of rotation of the pump when the low-speed function is active.
- **SOFT START**: enables (YES) or disables (NO) the soft start function. This parameter is visible only if the controller is configured in FRONT mode.
- **EXTERNAL FAN CNF**: Makes it possible to select driving mode of the external cooling fan. Possible options:
  - ALWAYS ON: the cooling fan is always ON
  - SERIAL: the cooling fan is controlled directly via the serial port.
- **VENT VALVE MODE**: makes it possible to select driving of the vent valve
  - AUTO TIME: the valve is controlled by the controller
  - MANUAL: the valve is controlled by the serial port.
  - AUTO PUMP SPEED: the valve is controlled by the controller, by taking into account the pump's deceleration.
- **VENT VALVE DELAY**: Sets the delay, expressed in seconds, between stopping of the pump and opening of the vent valve.
- **VENT VALVE OPEN TIME**: sets the time, expressed in seconds, of opening of the vent valve. Enter 0 if the valve is to be kept open indefinitely (until the next start).
- **LOAD GAS TYPE**: selects the type of gas used in the process. Therefore, the controller limits the power supplied to the pump according to the setting of this parameter, combined with the pump body temperature. Please always set up the LOAD GAS TYPE in accordance to the gas type used in the process. An improper selection of this setting could result in the damage of the pump.

- **RUN UP TIME**: it sets the maximum amount of time for which the pump is allowed to spin at a speed value less than the normal operating speed. The pump is not intended to spin for an indefinite time at a speed value lower than 700Hz; the Run Up Time value is selectable from 0 minutes to 30 minutes, default value is 15 minutes. If the pump, due to the gas flow applied to it, spins at a speed value less than 700Hz, the Run Up timer starts to count; when the counter value exceeds the Run Up Time set value, the pump will stop and the error condition "Run Up Time" will appear on the serial Win#206.
- **ACTIVE STOP**: enables (YES) or disables (NO) active braking.
- **STOP SPEED READING**: enables (YES) or disables (NO) the pump rotational frequency reading function also during the slowing phase that follows a stop command

# Input/Output Menu

This menu contains parameters that determine the operating mode of the inputs and outputs of the controller.

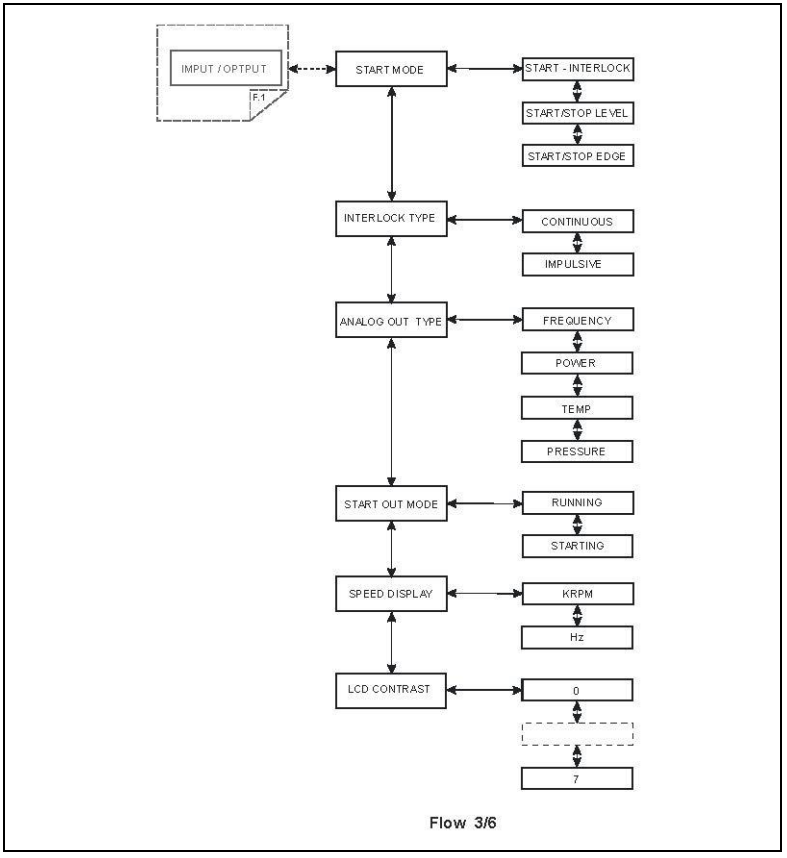



**Figure 40**

- **START MODE**: Permits selection of one of the three types of functioning of the START/STOP and INTERLOCK inputs:
  - START/INTERLOCK: The pump is started if the START/STOP input is activated and is stopped if the START/STOP input is de-activated. The interlock input must be constantly active (INTERLOCK TYPE parameter = continuous) or may be active only at the time of starting (INTERLOCK TYPE parameter = impulsive).

- START/STOP LEVEL The START/STOP input acts as only START command (active on the level) The INTERLOCK input acts as STOP command (active on the level).
  In the case of concurrent activation of the two inputs, the STOP command takes priority
- START/STOP EDGE The START/STOP input acts as START command (active on the edge)
  The INTERLOCK input acts as STOP command (active on the edge).

- **INTERLOCK TYPE**: This parameter is displayed only when the previous parameter (START MODE) is equal to START/INTERLOCK and permits selection of one of the following two operating modes of the INTERLOCK input:
  - CONTINUOUS: the INTERLOCK input must be active continuously so that the pump can be driven by the controller. If, with the controller in start, the input INTERLOCK is de-activated, the controller switches to WAITING INTERLOCK status and interrupts driving of the pump
  - IMPULSIVE: it is sufficient for the input to be active when the START command is sent to the pump. Subsequently, the input can also be de-activated. If the interlock is not active when the pump is started, the controller switches too WAITING INTERLOCK status.
- **ANALOG OUT TYPE**: permits selection of the type of signal to be sent to the programmable analogue output. One of the following signals can be selected:
  - FREQUENCY: the drive frequency of the pump is shown
  - POWER: the power supplied to the pump is shown
  - TEMPERATURE: the temperature of the pump is shown
  - PRESSURE: the pressure read by the gauge is shown.

- **START OUT MODE**: Selects the operating mode of the START output.
  Possible options:
  - RUNNING: the output is active when the pump is driven
  - STARTING: the output is active only during acceleration ramp-up.
- **SPEED OUT MODE (KRPM/Hz):** permits selection of the unit of measurement of the speed of rotation shown on the display of the controller.
  This setting acts only on the measurement shown on the display.
  Possible options:
  - KRPM
  - Hz
- **LCD CONTRAST**

# Setpoint R1 and Setpoint R2 Submenus

This submenu contains the settings relating to the output with relay R1 and R2 (if it is connected a gauge it will present also the settings for the set point 3).

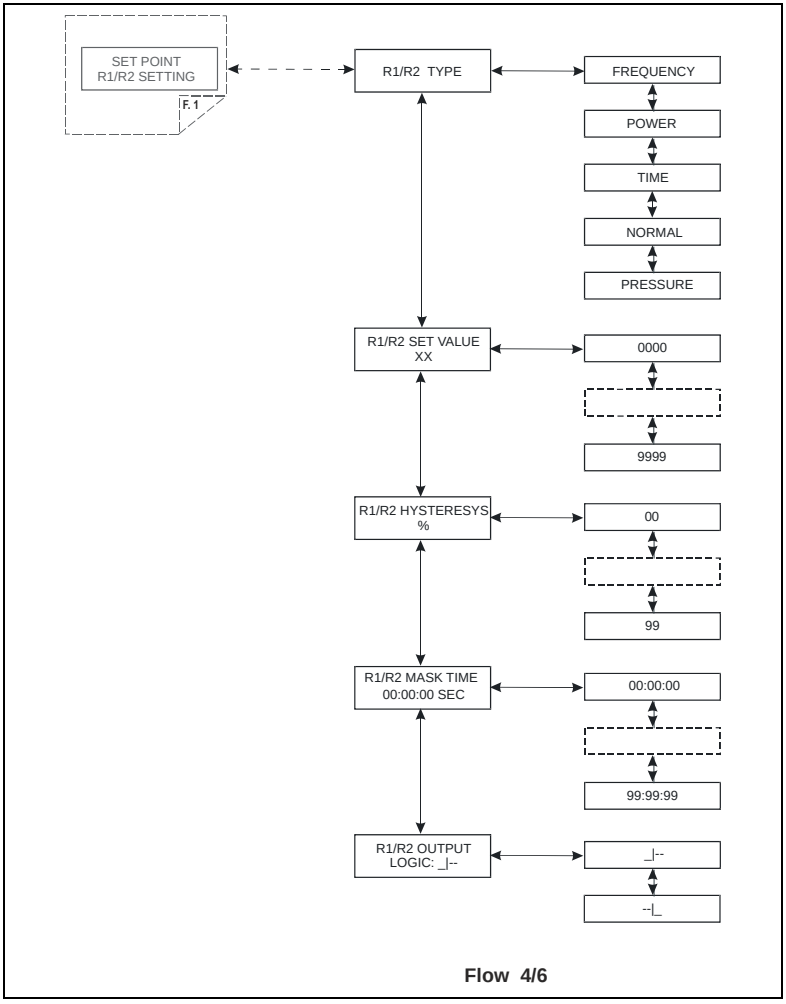



**Figure 41**

- **R1 (R2) TYPE**: selects the type of reference measurement to drive the relay. Possible types:
  - Frequency: driving frequency of the pump
  - Power: power supplied to the pump
  - Time: time from start
  - Normal: achievement of normal condition
  - Pressure: pressure read by the gauge, if present
- **R1 (R2) SET VALUE**: Sets the reference value at which the relay R1 (R2) is activated. This parameter has no effect if NORMAL (previous parameter) is selected as SETPOINT TYPE.
- **R1 (R2) HISTERESYS**: Sets, in percentage, the hysteresis of the relay
- **R1 (R2) MASK TIME**: sets the masked time (in hh:mm:ss), measured from start, within which the SETPOINT R1 (R2) is not driven even if the threshold value has been reached. This parameter is not available if SETPOINT TYPE is set to NORMAL
- **R1 (R2) OUTPUT LOGIC**: Selects the control logic of the SETPOINT output.
  - positive logic (the relay is energized when the measurement exceeds the reference)
  - negative logic (the relay is energized when the measurement is below the reference)

# Gauge Menu

This menu contains the parameters relating to functioning of the active gauge.

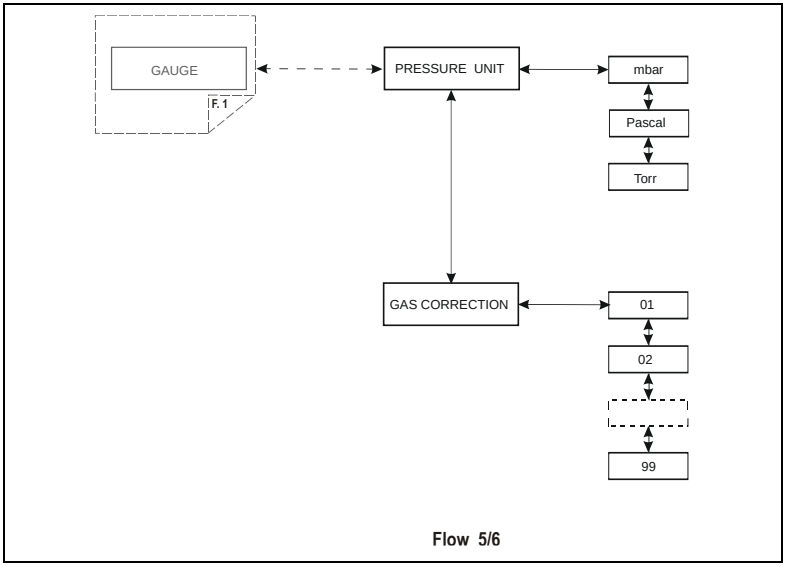



**Figure 42**

- **PRESSURE UNIT**: selects the unit of measurement of the pressure used to show this on the display, for display on the serial line and for setting of the setpoint and autopressure thresholds. Possible options:
  - mbar
  - Pascal
  - Torr

**GAUGE MODEL ID:** it shows the gauge model identified by the controller. If there are more model with the same identification the user can select the right gauge connected

- **GAS TYPE :** sets the gas type:
  0 : not configured
  1 : Nitrogen
  2 : Argon
  3 : Idrogen
  4 : Other

- **CORRECTION :** if it is selected the gas type 4 (Other) you can set the correction factor of the pressure measurement for this kind of gas.
  The pressure indicated by the instrument is equal to:
  P indicated = P measured x Gas correction / 10

# Serial Menu

This menu contains the settings for management of the RS232/485 serial line.

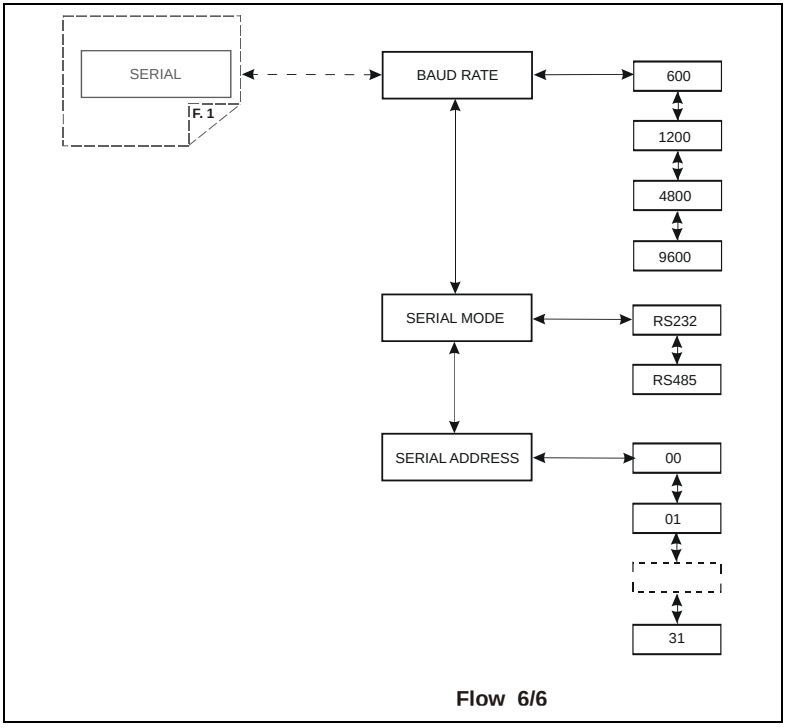



**Figure 43**

- **BAUD RATE**: permits selection of the communication speed selecting this from 600, 1200, 4800, 9600 baud
- **SERIAL MODE**: permits setting of the type of interface to RS232 (point to point) or RS485 (multidrop)
- **SERIAL ADDRESS**: sets the address of the node in the case of the RS485 interface. This parameter is not visible if the RS232 is selected.

# How to Use by Remote I/0

1. Power ON the controller
2. Press the “COUNTERS” and “MEASURES” button toghether.
3. Select MODE = REMOTE from the “INPUT/OUTPUT” menu
4. Exit from configuration menu
5. Connection example:

# How to Use in Serial Mode

1. Power on the controller
2. Connect the serial cable
3. Select by front panel if you want to work in 232 or 485, and if necessary, the serial address.
4. Select SERIAL from the INPUT/OUTPUT menu
5. Open the T+ software (see orderable parts table)
6. Ready to operate by SERIAL connections.

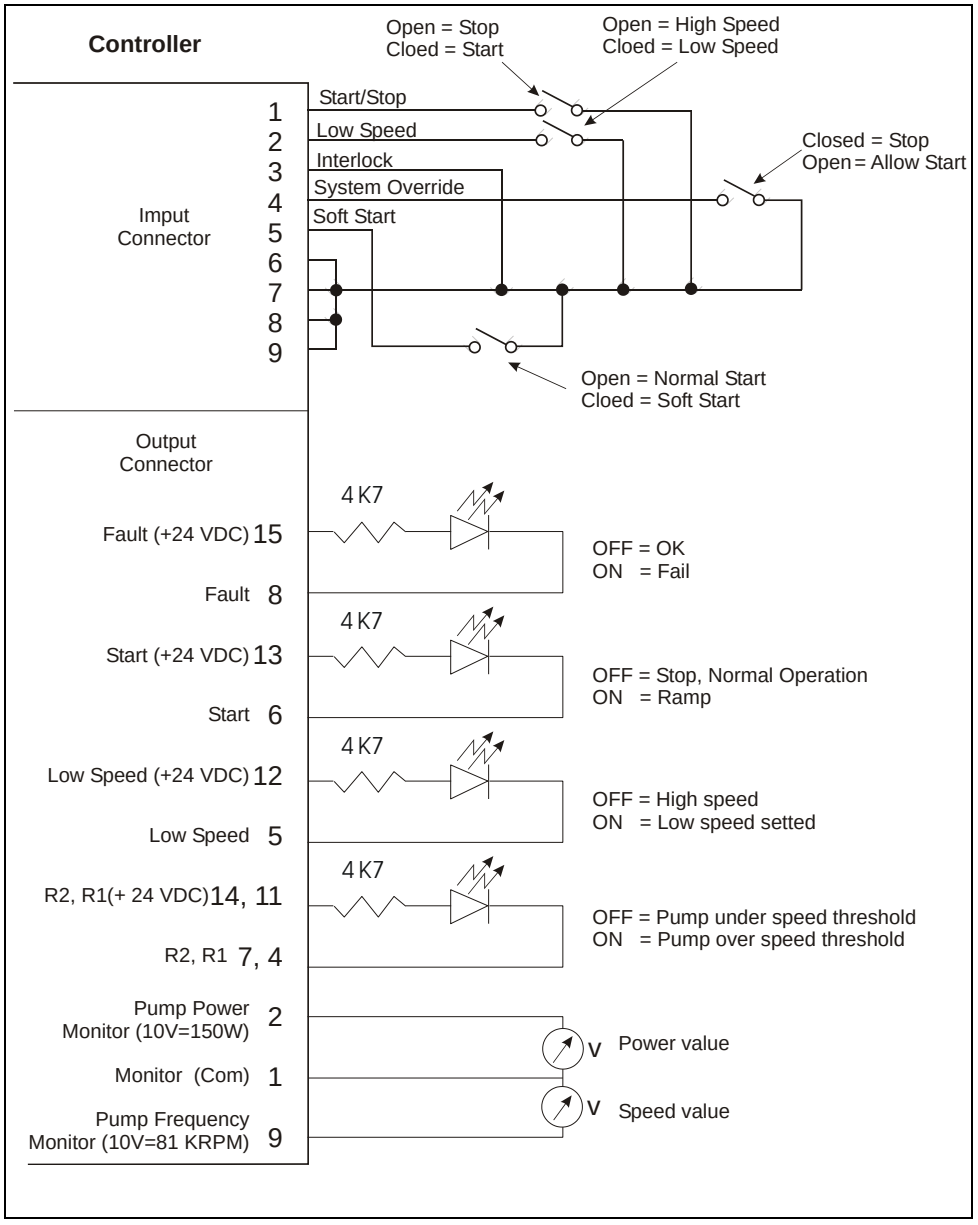

Controller
Open = Stop
Cloed = Start
Open = High Speed
Cloed = Low Speed
Start/Stop
Low Speed
Interlock
System Override
Soft Start
Closed = Stop
Open = Allow Start
Imput
Connector
1
2
3
4
5
6
7
8
9
Open = Normal Start
Cloed = Soft Start
Output
Connector
4 K7
Fault (+24 VDC) 15
Fault 8
OFF = OK
ON = Fail
4 K7
Start (+24 VDC) 13
Start 6
OFF = Stop, Normal Operation
ON = Ramp
4 K7
Low Speed (+24 VDC) 12
Low Speed 5
OFF = High speed
ON = Low speed setted
4 K7
R2, R1(+ 24 VDC) 14, 11
R2, R1 7, 4
OFF = Pump under speed threshold
ON = Pump over speed threshold
Pump Power
Monitor (10V=150W) 2
V
Power value
Monitor (Com) 1
V
Speed value
Pump Frequency
Monitor (10V=81 KRPM) 9

**Figure 44**

# Profibus Option

## General

The ProfiBus option allow to communicate with the controller as ProfiBus DP slave device.

The option works as a bi-directional bridge between the ProfiBus network and the Agilent turbo controller internal link. The interface provides input data (measures) and output data (commands) to the controller, and in addiction provides standard and user related diagnostics, in order to allow the user to manage the exceptions.

## Installation

This option is factory installed.

The ProfiBus connector pin-out is reported in the following figure. Please in order to obtain best performance use ProfiBus certified cables.

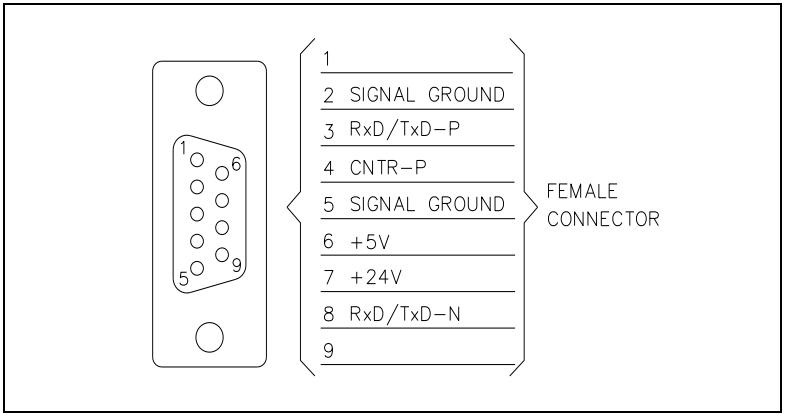



**Figure 45** ProfiBus connector

# Configuration

Before power-on the controller set the ProfiBus address by the 2 rotary switches.

Up to 126 different addresses (from 0 to 125) can be selected. The address value sets by the 2 switches is expressed in hexadecimal notation, so value from 00 to 7D are permitted; this setting is read by the interface during the power-on phase, so any change of the switch position after the power-on is ignored.

# Software Operation and State Machine

From the software point of view, the interface can be seen as two devices (one for ProfiBus and the other for the internal link) linked together.

Each device has its own state machine to manage the device operation.

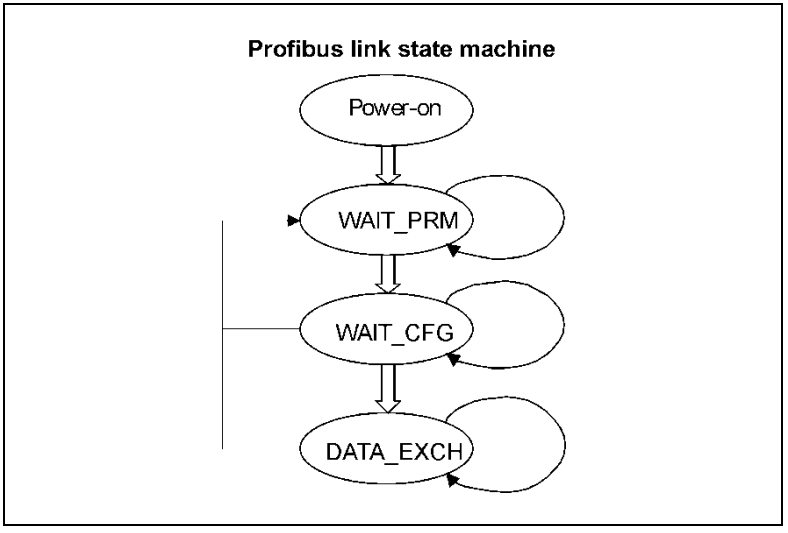



**Figure 46**

**Tab. 16** Profibus state machine

| Status | Meaning |
|---|---|
| POWER_ON | Interface set-up |
| WAIT_PRM | Wait for parameterisation from the master |
| WAIT_CFG | Wait for configuration from the master |
| DATA_EX | Regular data exchange |

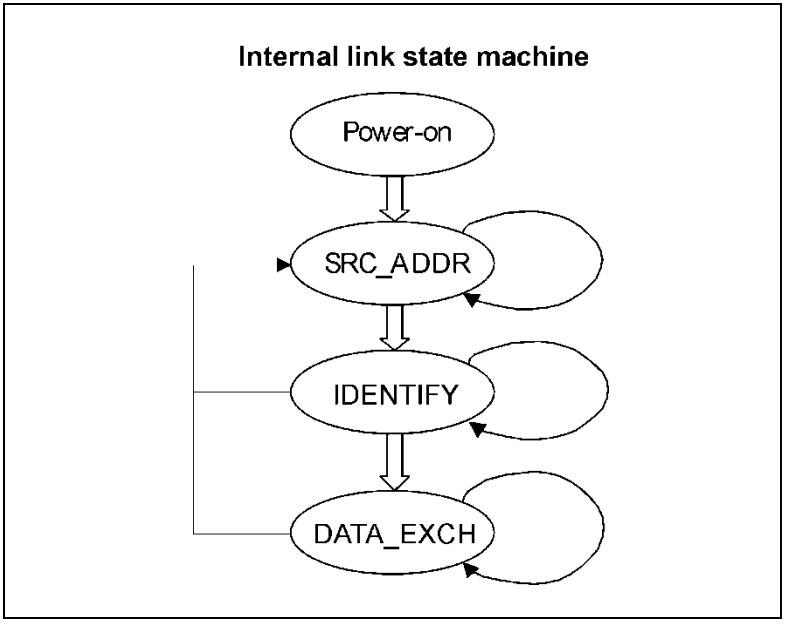



**Figure 47**

**Tab. 17** Internal link state machine

| Status | Meaning |
|---|---|
| POWER_ON | Interface set-up |
| SRC_ADDR | Search for the controller serial address |
| IDENTIFY | Identify controller model and protocol |
| DATA_EX | Regular data exchange |

The two machines continuously share I/O data with the relative bus, and interact each other only in following conditions:

- ProfiBus Data Exchange is suspended (static diagnosis activated) if the internal serial link in not established
- Internal serial link Data Exchange is suspended (only for output data) if the ProfiBus State machine is not in Data Exchange mode

As a general rule, unrecoverable communication errors make each machine to jump to the state immediately following the power-on state (WAIT_PRM or SRC_ADDR)

# Message Mapping

The communication is based on the continuous data exchange capability of the ProfiBus standard, where the master sends continuously the entire slave configuration and reads back the entire slave status. For this purpose one Input (from slave to master) and one Output (from master to slave) buffers are provided. All the needed parameters are mapped inside each buffer.

The following tables summarise the ProfiBus parameter access, related to the corresponding windows serial protocol (for this protocol please refers to the serial interface paragraph).

The interface doesn't any scaling operation on the read/written parameters. It acts only as a gateway between the ProfiBus network and the pump's controller serial interface. As a consequence of this, the scale and the meaning of some parameters depends directly to the specific model of Turbo Pump controller connected to the interface.

# Parameter Buffer

**Tab. 18** Parameter buffer

| OFFSET BYTE | SIZE BYTE | UNIT RES | RANGE | DESCRIPTION | WIN SERIAL |
|---|---|---|---|---|---|
| 0 | 1 | - | 0-99 | Gauge gas load type. The value is divided by 10 (entering 12 the controller will apply 1.2)<br>Enter here the correction factor for gas (necessary only if gauge is connected). | 161 |
| 1 | 2 | mA/Hz/sec | 0-10000 | Setpoint 1 value. Enter here the threshold value for the R1 output, valid only if $B_0$-$B_2$ of Parameter Buffer Offset-21 is equal to 0,1,2 or 3. | 102 |
| 3 | 2 | Sec | 0-30000 | Setpoint 1 Mask Time. Set here the time, measured from the start pump event, while the R1 output is masked (not activated) | 103 |
| 5 | 2 | mA/Hz/sec | 0-10000 | Setpoint 2 value. Enter here the threshold value for the R2 output, valid only if $B_3$-$B_5$ of Parameter Buffer Offset-21 is equal to 0,1,2 or 3. | 172 |
| 7 | 2 | Sec | 0-30000 | Setpoint 2 Mask Time. Set here the time, measured from the start pump event, while the R2 output is masked (not activated) | 173 |
| 9 | 2 | 0.2sec/bit | 0-30000 | Vent Valve Opening Delay.<br>Set the delay time between the stop command and vent opening. Valid only in “purge/vent auto mode” (Parameter Buffer, Offset 20, $B_0$ = 0). 0 = infinite (the valve will never open). | 126 |
| 11 | 2 | 0.2sec/bit | 0-30000 | Vent Valve Open Time. Set how long the vent will remain open, then both purge and vent will be closed. Valid only in “purge/vent auto mode” (Parameter Buffer, Offset 20, $B_0$ = 0). 0 = infinite (the valve remain open till next start command). | 147 |
| 13 | 1 | % | 1-99 | Setpoint 1 Hysteresis. Set the Setpoint1 hysteresis around the nominal value | 105 |
| 14 | 1 | % | 1-99 | Setpoint 2 Hysteresis. Set the Setpoint2 hysteresis around the nominal value | 175 |
| 15 | 1 | mBar/Torr/Pa | 0-99 | Setpoint 1 Pressure Value Mantissa.<br>Set the mantissa of the exponential value of the R1 setpoint (format X.XE-XX) when it is used for pressure monitoring (Parameter Buffer, Offset 21, $B_{0\text{-}2}$ = 4). The value set here is divided by 10, that means 11 = 1.1 | 162 |

| OFFSET BYTE | SIZE BYTE | UNIT RES | RANGE | DESCRIPTION | WIN SERIAL |
|---|---|---|---|---|---|
| 16 | 1 | | -10 - +10 | Setpoint 1 Pressure Value Exponent.<br>Set the exponent of the exponential value of the R1 setpoint (format X.XE-XX) when it is used for pressure monitoring (Parameter Buffer, Offset 21, $B_{0-2}$ = 4). | 162 |
| 17 | 1 | mBar/Torr/Pa | 0-99 | Setpoint 2 Pressure Value Mantissa.<br>Set the mantissa of the exponential value of the R2 setpoint (format X.XE-XX) when it is used for pressure monitoring (Parameter Buffer, Offset 21, $B_{3-5}$ = 4). The value set here is divided by 10, that means 11 = 1.1 | 176 |
| 18 | 1 | | -10 - +10 | Setpoint 2 Pressure Value Exponent.<br>Set the exponent of the exponential value of the R2 setpoint (format X.XE-XX) when it is used for pressure monitoring (Parameter Buffer, Offset 21, $B_{3-5}$ = 4). | 176 |
| 19 | 1 | | | $B_0$= Stop Speed Reading.<br>This function measures the pump speed after a stop command.<br>0 = Off<br>1 = On | 167 |
| | | | | $B_1$= Active Stop.<br>This function brakes the pump after a stop command, by using the motor as a generator.<br>0 = Off<br>1 = On | 107 |
| | | | | $B_2$ - Reserved | |
| | | | | $B_{3-4}$ = Start/Stop/Interlock Mode.<br>Change the logic of Start/Stop and Interlock inputs. Ask to Agilent personnel for this option | 151 |
| 20 | 1 | | | $B_0$ = Vent & Purge Auto/Man<br>0 = Auto (the controller drives purge and vent valves automatically)<br>1 = Manual (the user can command the valves by serial line or profibus) | 125 |

| OFFSET BYTE | SIZE BYTE | UNIT RES | RANGE | DESCRIPTION | WIN SERIAL |
|---|---|---|---|---|---|
| | | | | $B_1$ = Gas Load Type. Select here the gas load<br>0 = Ar<br>1 = N2 | 157 |
| | | | | $B_2$ = Interlock Type<br>0 = continuos (the interlock must be always present to run the pump)<br>1 = at start (the interlock must be present only at start command) | 110 |
| | | | | $B_3$ = Setpoint R1 Logic<br>0 = active close (NO)<br>1 = active open (NC) | 104 |
| | | | | $B_4$ = Setpoint R2 Logic<br>0 = active close (NO)<br>1 = active open (NC) | 174 |
| | | | | $B_{5-6}$ = Pressure Unit<br>0 = mbar<br>1 = Pascal<br>2 = Torr | 163 |
| | | | | $B_7$ = Reserved | |
| 21 | 1 | | | $B_{0-2}$ = Setpoint R1 Type<br>0 = frequency<br>1 = current<br>2 = time<br>3= normal operation<br>4= pressure | 101 |
| | | | | $B_{3-5}$ = Setpoint R2 Type<br>0 = frequency<br>1 = current<br>2 = time<br>3= normal operation<br>4= pressure | 171 |
| | | | | $B_{6-7}$ = Analog Output 1 Type<br>0 = frequency<br>1 = power<br>2 = temperature<br>3= pressure | 111 |

# Output Buffer

**Tab. 19** Output buffer

| OFFSET BYTE | SIZE BYTE | UNIT RES | RANGE | DESCRIPTION | WIN SERIAL |
|---|---|---|---|---|---|
| 0 | 1 | | | $B_7$ = Start/Stop<br>0 = Stop, 1 = Start | 000 |
| | | | | $B_6$ = Low Speed<br>This bit set the pump target speed to “low speed value” (Output Buffer, Offset 3), otherwise the target speed is set to “high speed value” (Output Buffer, Offset 1).<br>0 =Off, 1 =On | 001 |
| | | | | $B_5$ – Soft Start<br>This bit activates the soft start function which run-up the pump smoothly. Please activate this function only if the pump has been stopped for at least3 months.<br>0 = On, 1= Off | 100 |
| | | | | $B_4$ = Vent Valve Command<br>0 = Close, 1 = Open<br>Valid only if in Par Buff, Offset-20, $B_0$=1 | 122 |
| | | | | $B_3$ = Purge Valve Command<br>0 = Close, 1 = Open<br>Valid only if Par Buff, Offset-20, $B_0$=1 | 145 |
| | | | | $B_2$ – Not used | |
| | | | | $B_{0-1}$ = Operating Mode<br>These bits define from which source the controller has to get commands (readings are always available). In order to operate the controller by Profibus these bits must be set to 3.<br>0 = Remote I/O<br>1 = Serial<br>2 = Front panel<br>3 = Profibus | 008 |
| 1 | 2 | Hz | 1100 - 1350 | High Speed Value<br>Set the high rotational speed value | 120 |
| 3 | 2 | Hz | 1100 - 1350 | Low Speed Value<br>Set the low rotational speed value | 117 |

# Input Buffer

**Tab. 20** Input buffer

| OFFSET BYTE | SIZE BYTE | UNIT RES | RANGE | DESCRIPTION | WIN SERIAL |
|---|---|---|---|---|---|
| 0 | 1 | V | 0-100 | Voltage<br>Voltage provided to the motor | 201 |
| 1 | 1 | °C | 0-100 | Pump Bearing Temperature<br>Read the pump upper bearing temperature<br>If > 60 °C the controller goes into fail status and the pump is stopped | 204 |
| 2 | 1 | °C | 0-100 | Controller Power Supply Temperature<br>Read the controller power section temperature if > 75 °C the controller goes in fail status “controller over-temperature” | 216 |
| 3 | 1 | °C | 0-100 | Controller CPU Section Temperature<br>Read the controller CPU section temperature if > 80 °C the controller goes in fail “controller overtemperature” | 211 |
| 4 | 1 | - | 0-6 | $B_{0-3}$ – Status<br>0 = Stop<br>1= Waiting for interlock (interlock connections on remote I/O connector missing)<br>2 = Ramp (the pump is increasing the speed)<br>3 = Auto tuning (the speed has been reduced because the gas load is higher than the Power Limit Applied)<br>4 = Braking (the pump is reducing the speed using the motor)<br>5 = Normal operation (the pump is at target speed)<br>6 = Fail (see error code byte Input Buffer Byte-27) | 205 |
| 5 | 1 | - | - | Error Code (bit field) | 206 |
| | | | | $B_7$ – Too High Load (the gas load is too high for the pump) | |
| | | | | $B_6$ – Short Circuit (a short circuit happened between the two of the three motor phases) | |
| | | | | $B_5$ – Over Voltage (too high bus voltage during braking) | |
| | | | | $B_4$ – Verify Line Select<br>Not used | |
| | | | | $B_3$ – Power Fail (internal circuitry failure) | |

| OFFSET BYTE | SIZE BYTE | UNIT RES | RANGE | DESCRIPTION | WIN SERIAL |
|---|---|---|---|---|---|
| | | | | $B_2$ – Controller Over-Temperature (“Controller Power Section Temperature” or “Controller CPU Section Temperature” are over the limit) | |
| | | | | $B_1$ - Pump Over-Temperature (“Pump Bearing Temperature” or “Pump Body Temperature” are over the limit) | |
| | | | | $B_0$ – Check Connection To Pump (the connection between controller and pump missing) | |
| 6 | 1 | - | - | $B_0$ – Set Point R1 Status<br>0 = open<br>1 = closed | 221 |
| | | | | $B_1$ – Set Point R2 Status<br>0 = open<br>1 = closed | 225 |
| | | | | $B_2$ – Vent Valve Status<br>0 = closed<br>1 = open | 122 |
| | | | | $B_3$ – Purge Valve Status<br>0 = close<br>1 = open | 145 |
| | | | | $B_4$ – Not Used | |
| | | | | $B_5$ – Not Used | |
| | | | | $B_6$ – Not Used | |
| | | | | $B_7$ – Not Used | |
| 7 | 2 | mA | 0-10000 | Current<br>Motor current consumption | 200 |
| 9 | 2 | W | 0-200 | Power<br>Motor power adsorption | 202 |
| 11 | 2 | W | 0-200 | Power Limit Applied<br>Maximum allowable power | 155 |
| 13 | 2 | Hz | 0-1500 | Driving Frequency<br>Read the rotational speed of the pump | 203 |
| 15 | 2 | Hz | 0-1500 | Target Frequency<br>Read the target rotational speed | 120 |

| OFFSET BYTE | SIZE BYTE | UNIT RES | RANGE | DESCRIPTION | WIN SERIAL |
|---|---|---|---|---|---|
| 17 | 2 | - | 0-65536 | Cycle Number<br>Number of cycles (start and stop) done by the pump | 301 |
| 19 | 2 | min | 0-65536 | Last Cycle Time<br>How long the last cycle lasted | 300 |
| 21 | 2 | h | 0-65536 | Pump Life<br>Total pump running time | 302 |
| 23 | 4 | mBar/<br>Torr/Pa | - | Pressure Reading<br>Reports the pressure reading in the “pressure unit” selected by Par. Buff., Offset-20, $B_{5-6}$ | 224 |

# Diagnostic Management

In addition to the ProfiBus six byte standard diagnostic, the interface provides both user diagnostic and static diagnostics functions.

The standard diagnostic management is fully compliant with the ProfiBus specification.

During the start-up phase after power on, the first byte in the user diagnostic area, can assume values different from zero.

This byte has the following meaning:

- Bit 0 = 1: controller not responds (RS485 link broken)
- Bit 1 = 1: controller not identified (not compatible with the ProfiBus gateway)
- Bit 2 = 1: first loop of requests not ended (values in the input data are not fully coherent yet)

So, if the first byte is equal to 0, the interface is working properly, otherwise there is a problem.

Each nibble in the bytes following the interface status byte represents the status of the last attempt to write a parameter with following coding (diag status byte):

0 Write success

1 Controller response was “NACK”

2 Controller response was “Unknown window”

3 Controller response was “Bad Data Type”

4 Controller response was “Over range”

5 Controller response was “Bad operation”

6 Controller response was an unknown response

F Parameter not supported by the controller

The ProfiBus external diagnosis services are used to report following unexpected situations:

- **Controller fail:** if the controller goes in fail mode, an external diagnostic service is required and one byte in the diagnostic buffer signals the type of failure.
- **User parameter mismatch:** if the user sets one or more parameters out of their allowed range, a ProfiBus external diagnostic service is required and some bits in the diagnosis frame signals which parameter is wrong (i.e. over range or under range).

# Diagnostic Buffer

**Tab. 21** Diagnostic buffer

| OFF SET | MEANING | | |
|---|---|---|---|
| 0 | $B_0$ | station non exist (set by master) | Standard diagnostic |
| | $B_1$ | station not ready (slave not ready for data exchange) | |
| | $B_2$ | cfg fault (configuration data doesn't match) | |
| | $B_3$ | ext diag (slave has external diagnostic data) | |
| | $B_4$ | not supported (slave doesn't support requested function) | |
| | $B_5$ | invalid slave response ( slave sets permanent '0') | |
| | $B_6$ | prm fault (wrong parameter assignment) | |
| | $B_7$ | master_lock (slave is parameterised by another master) | |
| 1 | $B_0$ | prm req (slave has to be re-parameterised) | |
| | $B_1$ | stat diag (static diagnosis) | |
| | $B_2$ | fixed '1' | |
| | $B_3$ | wd_on (response monitoring active) | |
| | $B_4$ | Freeze mode (received freeze command) | |
| | $B_5$ | Synch mode (received synch command) | |
| | $B_6$ | reserved | |
| | $B_7$ | diag deactivated (slave is parameterised by another master) | |
| 2 | Reserved | | |
| 3 | Master Add (master address after parameterisation. FF= without parameter) | | |
| 4 | Ident number high | | |
| 5 | Ident number low | | |
| 6 | External diagnosis "Header" length indication including header | | |

| OFF SET | MEANING |
|---|---|
| 7 | Interface Status<br>$B_0$ Controller not responds<br>$B_1$ Controller not identified<br>$B_2$ Input data not fully coherent yet<br>$B_3$ Not used<br>$B_{4-7}$ Not used |
| 8 | $B_{7-4}$ – Start/Stop diag status<br>$B_{3-0}$ – Low Speed diag status |
| 9 | $B_{7-4}$ – Soft Start diag status<br>$B_{3-0}$ – Vent Valve |
| 10 | $B_{7-4}$ – Purge Valve<br>$B_{3-0}$ – Mode |
| 11 | $B_{7-4}$ – High speed<br>$B_{3-0}$ – Low Speed |

# Error Messages

For a certain type of failure, the controller will self-diagnose the error and the following messages will be displayed.

**NOTE** If the pump is not connected, the display will be as shown in the following figure.

| | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| C | H | E | C | K | | C | O | N | N | E | C | T | I | O | N |
| | | | T | O | | P | U | M | P | | | | | | |

Check connection between controller and pump, then press STOP push-button twice to start the pump.

**NOTE** If the P1 input connector is not in position with the link or the external interlock connections are open, when the START pushbutton is pressed the display will be as shown in the following figure.

| | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | W | A | I | T | I | N | G | | | | |
| | | | | I | N | T | E | R | L | O | C | K | | | |

Disconnect connector P1 and check the link or the external interlock, then install the connector to start the pump.

**NOTE** If within each step of the soft start mode the rotational speed of the pump do not reach the planned value within 15 minutes the display will be as shown in the following figure.

| | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | R | U | N | | U | P | | T | I | M | E | | | |
| | | | | | | | | | | | | | | | |

Adjust the process gas flow as appropriate in order to allow the pump to always spin at a speed value greater than 700Hz.

**NOTE** Run Up Time is the maximum amount of time for which the pump is allowed to spin at a speed value less than the normal operating speed.
The pump is not intended to spin for an indefinite time at a speed value lower than 700Hz. If the pump, due to the gas flow applied to it, spins at a speed value less than 700Hz, the Run Up timer starts to count; when the counter value exceeds the Run Up Time set value, the pump will stop and the error condition "Run Up Time" will appear on the display.

---

**NOTE** If in normal operation (after the starting phase) the current drawn by the pump is higher than programmed (1.8 A), the pump and the inter-connected devices are switched off and the display will be as shown in the following figure.

---

| | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | T | O | O | | H | I | G | H | | L | O | A | D | | |
| | | | | | | | | | | | | | | | |

Verify that systems has no leaks than press STOP RESET pushbutton twice to start the pump.
Check that pump rotor is free to rotate then press the STOP RESET pushbutton twice to start the pump.

**NOTE** If the upper bearing/pump temperature exceeds 60 °C, the pump is shut off, and the display will be as shown in the following figure.

| | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | P | U | M | P | | | | | | |
| | | | | O | V | E | R | T | E | M | P | | | | |

The message will stay on until the temperature decreases below threshold value. Press the STOP RESET pushbutton twice to start the pump.

**NOTE** If the controller transformer temperature exceeds 90°C, the pump is shut off, and the display will be as shown in the following figure.

| | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | C | O | N | T | R | O | L | L | E | R | | | |
| | | | | O | V | E | R | T | E | M | P | | | | |

**NOTE** If the pump is stopped by an emergency stop signal provided via a remote contact, the display will be as shown in the following figure.

| | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | S | Y | S | T | E | M | | | | | | |
| | | | O | V | E | R | R | I | D | E | | | | | |

Remove the controller power cable and check the emergency condition.

Then reconnect the power cable and press the START pushbutton to start the pump.

| | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | O | V | E | R | V | O | L | T | A | G | E | | | |
| | | | | | | | | | | | | | | | |

Controller power supply circuitry is faulty, or the Controller received a spike.

Press the START push-button twice to start the pump. Should the message still be present, call the Agilent service.

| | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | S | H | O | R | T | | C | I | R | C | U | I | T | | |
| | | | | | | | | | | | | | | | |

Check connections and shortages between pump and controller, then press the STOP RESET pushbutton twice to start the pump.

# Orderable Parts

**Tab. 22**

| Description | Part number |
|---|---|
| Air Cooling Kit (0.5 m cable) | X3500-68011 |
| Air Cooling Kit extention cable (5 m) | 9699940 |
| Vent Valve N.O. 0,5 mm orifice (0,5 m cable) | 9699844 |
| Vent Valve extention cable (5 m) | 9699941 |
| Mains cable NEMA plug (3 m) | 9699958 |
| Mains cable european plug (3 m) | 9699957 |
| RS232 Serial to B/T Adapter | X3514-68003 |

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Agilent Technologies

***Vacuum Products Division***

*Dear Customer,*

*Thank you for purchasing an Agilent vacuum product. At Agilent Vacuum Products Division we make every effort to ensure that you will be satisfied with the product and/or service you have purchased.*

*As part of our Continuous Improvement effort, we ask that you report to us any problem you may have had with the purchase or operation of our products. On the back side you find a Corrective Action request form that you may fill out in the first part and return to us.*

*This form is intended to supplement normal lines of communications and to resolve problems that existing systems are not addressing in an adequate or timely manner.*

*Upon receipt of your Corrective Action Request we will determine the Root Cause of the problem and take the necessary actions to eliminate it. You will be contacted by one of our employees who will review the problem with you and update you, with the second part of the same form, on our actions.*

*Your business is very important to us. Please, take the time and let us know how we can improve.*

*Sincerely.*

*Giampaolo LEVI*

*Vice President and General Manager*
*Agilent Vacuum Products Division*

Note: Fax or mail the Customer Request for Action (see backside page) to Agilent Vacuum Products Division (Torino) – Quality Assurance or to your nearest Agilent representative for onward transmission to the same address.

**CUSTOMER REQUEST FOR CORRECTIVE / PREVENTIVE / IMPROVEMENT ACTION**

TO: AGILENT VACUUM PRODUCTS DIVISION TORINO – QUALITY ASSURANCE FAX

N°: XXXX-011-9979350

ADDRESS: AGILENT TECHNOLOGIES ITALIA S.p.A. – Vacuum Products Division –

Via F.lli Varian, 54 – 10040 Leinì (TO) – Italy

E-MAIL: vpd-qualityassurance_pdl-ext@agilent.com

| NAME | COMPANY | FUNCTION |
|---|---|---|
| ADDRESS:<br><br>TEL. N° : FAX N° :<br><br>E-MAIL: | | |
| PROBLEM / SUGGESTION :<br><br>REFERENCE INFORMATION (model n°, serial n°, ordering information, time to failure after installation, etc.):<br><br>DATE | | |
| CORRECTIVE ACTION PLAN / ACTUATION (by AGILENT VPD) LOG N° | | |

XXX = Code for dialing Italy from your country (es. 01139 from USA; 00139 from Japan, etc.)

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## Vacuum Products Division
## Instructions for returning products

Dear Customer,

Please follow these instructions whenever one of our products needs to be returned.

Complete the attached **Request for Return form** and send it to Agilent Technologies (see below), taking particular care to include the completed **Health and Safety** declaration Section. No work can be started on your unit until we receive a completed copy of this form.
After evaluating the information, Agilent Technologies will provide you with a **Return Authorization (RA) number** via email or fax, as requested. Note: Depending on the type of return, a Purchase Order may be required at the time **the Request for Return is submitted**. We will quote any necessary services (evaluation, repair, special cleaning, eg).

Product preparation

- Remove all accessories from the core product (e.g. inlet screens, vent valves).
- Prior to shipment and if applicable for your product, drain any oils or other liquids, purge or flush all gasses, and wipe off any excess residue.
- If ordering an Advance Exchange product, please use the packaging from the Advance Exchange to return the defective product.
- Seal the product in a plastic bag, and package product carefully to avoid damage in transit. You are responsible for loss or damage in transit.
- Include a copy of the Health and Safety Declaration in the shipping documentation on the outside of the shipping box of your returning product.
- Clearly label package with RA number. Using the shipping label provided will ensure the proper address and RA number are on the package. Packages shipped to Agilent without a RA clearly written on the outside cannot be accepted and will be returned.
- Return only products for which the RA was issued.

Shipping

- Ship to the location specified on the printable label, which will be sent, along with the RA number, as soon as we have received all of the required information. Customer is responsible for freight charges on returning product.
- Return shipments must comply with all applicable Shipping Regulations (IATA, DOT, ADR, etc.) and carrier requirements.

RETURN THE COMPLETED **REQUEST FOR RETURN** FORM TO YOUR NEAREST LOCATION:

| **EUROPE:** | | **NORTH AMERICA:** | | **PACIFIC RIM:** |
|---|---|---|---|---|
| Fax: | 00 39 011 9979 330 | | | |
| Fax Free: | 00 800 345 345 00 | Fax: | 1 781 860 9252 | Please visit our website for |
| Toll Free: | 00 800 234 234 00 | Toll Free: | 800 882 7426, Option 3 | individual office information |
| vpt-customercare@agilent.com | | vpl-ra@agilent.com | | http://www.agilent.com |

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## Vacuum Products Division
## Terms and conditions

**TERMS AND CONDITIONS**

**Please read the terms and conditions below as they apply to all returns and are in addition to the Agilent Technologies Vacuum Product Division – Products and Services Terms of Sale.**

- Unless otherwise pre-negotiated, customer is responsible for the freight charges for the returning product. Return shipments must comply with all applicable **Shipping Regulations** (IATA, DOT, etc.) and carrier requirements.
- Agilent Technologies is not responsible for returning customer provided packaging or containers.
- Customers receiving an Advance Exchange product agree to return the defective, rebuildable part to Agilent Technologies **within 15 business days**. Failure to do so, or returning a non-rebuildable part (crashed), will result in an invoice for the non-returned/non-rebuildable part.
- Returns for credit toward the purchase of new or refurbished Products are subject to prior Agilent approval and may incur a restocking fee. Please reference the original purchase order number.
- Units returned for evaluation will be evaluated, and a quote for repair will be issued. If you choose to have the unit repaired, the cost of the evaluation will be deducted from the final repair pricing. A Purchase Order for the final repair price should be issued within 3 weeks of quotation date. Units without a Purchase Order for repair will be returned to the customer, and the evaluation fee will be invoiced.
- Products returned that have not been drained from oil will be disposed.
- A Special Cleaning fee will apply to all exposed products.
- If requesting a calibration service, units must be functionally capable of being calibrated.

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# Vacuum Products Division
# Request for Return Form

| **Customer information** | | |
|---|---|---|
| Company : | Contact Name: | |
| Address: | Tel: | Fax: |
| | Email: | |

| **Equipment** | | | |
|---|---|---|---|
| Product description | Agilent PartNo | Agilent Serial No | Original Purchasing Reference |
| | | | |
| Failure description | | Type of process (for which the equipment was used) | |

**Type of return**

☐ Non Billable ☐ Billable ➡ New PO # (hard copy must be submitted with this form): _____

☐ Exchange ☐ Repair ☐ Upgrade ☐ Demo ☐ Calibration ☐ Evaluation ☐ Return for Credit

**Health and safety**

The product has been exposed to the following substances:
(by selecting 'YES' you MUST complete the table to the right)

**Substances** (please refer to MSDS forms)

* Agilent will not accept delivery of any product that is exposed to radioactive, biological, explosive substances or dioxins, PCB's without written evidence of decontamination.

| | | Trade name | Chemical name | Chemical Symbol | CAS Number |
|---|---|---|---|---|---|
| Toxic | ☐ YES ☐ NO | | | | |
| Harmful | ☐ YES ☐ NO | | | | |
| Corrosive | ☐ YES ☐ NO | | | | |
| Reactive | ☐ YES ☐ NO | | | | |
| Flammable | ☐ YES ☐ NO | | | | |
| Explosive (*) | ☐ YES ☐ NO | | | | |
| Radioactive (*) | ☐ YES ☐ NO | | | | |
| Biological (*) | ☐ YES ☐ NO | | | | |
| Oxidizing | ☐ YES ☐ NO | | | | |
| Sensitizer | ☐ YES ☐ NO | | | | |
| Other dangerous substances | ☐ YES ☐ NO | | | | |

**Goods preparation**

If you have replied YES to one of the above questions. Has the product been purged? ☐ YES ☐ NO
If yes, which cleaning agent/method:

Has the product been drained from oil? ☐ YES ☐ NOT APPLICABLE
I confirm to place this declaration on the outside of the shipping box. ☐

**I declare that the above information is true and complete to the best of my knowledge and belief.**
**I understand and agree to the terms and conditions on page 2 of this document.**

| | |
|---|---|
| Name: | Authorized Signature: |
| Position: | |
| Date: | |

**NOTE**: If a product is received at Agilent which is contaminated with a toxic or hazardous material that was not disclosed, **the customer will be held responsible** for all costs incurred to ensure the safe handling of the product, and is liable for any harm or injury to Agilent employees as well as to any third party occurring as a result of exposure to toxic or hazardous materials present in the product.

# Agilent Vacuum Products Division/Sales and Service Offices

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***07/2018***

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**Worldwide Web Site, Catalog and Order On-line:**
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Representatives in most countries

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